

INSTITUTE OF SCIENCE, TECHNOLOGY & ADVANCED STUDIES (VISTAS)
(Deemed to be University Estd. u/s 3 of the UGC Act, 1956)
PALLAVARAM, THALAMBUR, PERIYAPALAYAM-CHENNAI
ACCREDITED BY NAAC WITH 'A++' GRADE

UNDERGRADUATE DEGREE PROGRAMME

B.Sc. Aeronautical Science

Three Years

/

B.Sc. (Hons). Aeronautical Science

Four Years

CURRICULUM & SYLLABUS

REGULATION 2024

Choice Based Credit System (CBCS)

&

Learning Outcomes Based Curriculum Framework (LOCF)

Effective from the Academic Year

2024 -2025

Department of Aviation



INSTITUTE OF SCIENCE, TECHNOLOGY & ADVANCED STUDIES (VISTAS)
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DEPARTMENT OF AVIATION

VISION OF THE DEPARTMENT
To be forefront in the aviation field by contributing to the intellectual, social and economic development of the aviation industry and the citizens of our nation. It is served through precept, research fueled by the advanced curriculum to endeavour the highest standards to excel in their Aviation profession.

MISSION OF THE DEPARTMENT	
M1	To empower and encourage the students with the knowledge and practical skills required in the field of Aviation
M2	To impart quality education through the technologically advanced curriculum which would be delivered by the industry experts.
M3	To train the students to have in-depth knowledge of the subjects in the field of aviation and groom them in soft skills & survival skills.

PROGRAMME EDUCATIONAL OUTCOMES (PEO)	
PEO1	To Produce Graduates demonstrating their critical thinking, communication, team work and situational awareness skills on daily basis
PEO2	To produce graduates who can meet the diversified needs of the aviation industry.
PEO3	To gain an understanding of professional and ethical behaviour in the aviation field.
PEO4	To produce graduates who function effectively in a corporate environment and individually

PROGRAMME OUTCOMES (PO)	
PO1	**Problem-solving:** Students can build the capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply one's learning to real-life situations.
PO2	**Scientific reasoning:**Students can analyze, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.
PO3	**Lifelong learning:** Students can acquire knowledge and skills, including "learning how to learn", that is necessary for participating in learning activities throughout life.
PO4	**Moral and ethical awareness/reasoning:** Students can embrace moral/ethical values in conducting one's life, formulate a position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work. Capable of demonstrating the ability to identify ethical issues related to one's work, avoid unethical behavior such as fabrication, falsification or misrepresentation of data or committing plagiarism, not adhering to intellectual property rights; appreciating environmental and sustainability issues; and adopting an objective, unbiased and truthful actions in all aspects of work.
PO5	**Information/digital literacy:** Students can use ICT in a variety of learning situations, demonstrate the ability to access, evaluate, and use a variety of relevant information sources; and use appropriate software for analysis of data.
PO6	**Multicultural competence:** Students can get knowledge of the values and beliefs of multiple cultures and a global perspective, and the capability to effectively engage in a multicultural society and interact respectfully with diverse groups.

PO7	**Leadership readiness/qualities:** Students can develop the ability to mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team that can help achieve the vision, motivating and inspiring team members to engage with that vision, and using management skills to guide people to the right destination, smoothly and efficiently.

PROGRAMME SPECIFIC OUTCOMES (PSO)	
PSO1	Able to understand the various scientific principles and they can able to apply in the field of Aviation.
PSO2	Demonstrate ability to research information pertinent to their aviation discipline.
PSO3	Realize the need to continuously gain knowledge throughout life within and outside of aviation

KNOWLEDGE IS POWER

BOARD OF STUDIES

List of Members

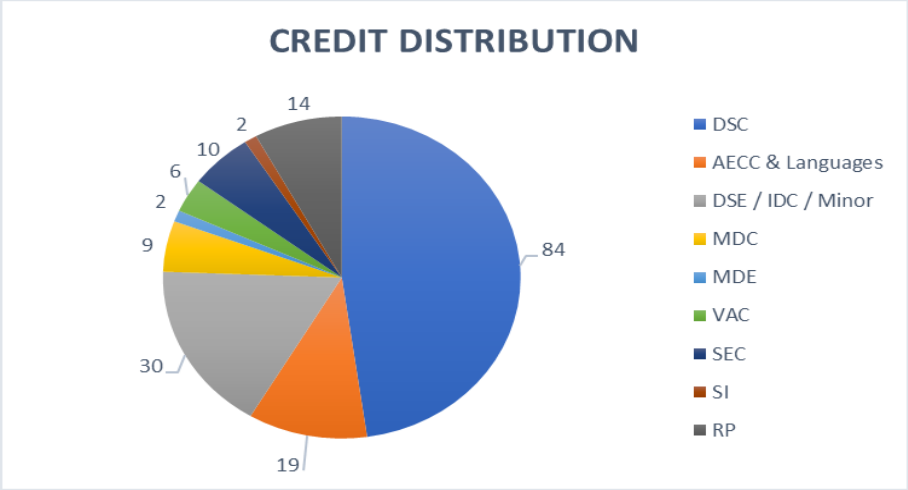
Department of Aviation

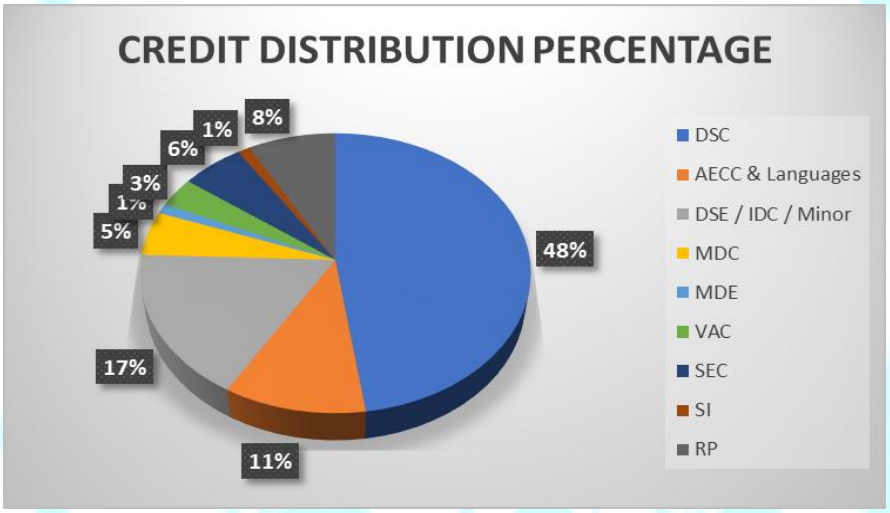
S. No	Name & Designation	Address	Role
1.	**Dr. S. Ramasubramanian** Associate Professor & Head	Department of Aviation VISTAS, Chennai– 600117 Mob: 98407 17534 Email ID: hodaviation@velsuniv.ac.in	Chairman
2.	**Dr. P. N. Kadiresh** Professor	Department of Aerospace Engineering, BS Abdur Rahman Crescent Institute of Science and Technology, Mob: 9444226195 Email ID: kadiresh@cresent.education	External member Academic Expert
3.	**Mr. Vinoth Kumar K** Data Engineer	Boeing India Private Limited, Chennai Ph: 9486146884 email I'd: vinothkumar.krishnamoorthy@boeing.com	External member Industry Expert
4.	**Ms. Sana Fatima,** Customer Executive	Air India, Chennai. Ph: 6374922761 Email ID: sanafatima0228@gmail.com	Alumni Member (External Member)
5.	**Dr. M.Chandrasekaran** Professor and Dean Academic Courses,	Dean Academic Courses VISTAS, Chennai. – 600117 Mob: 9790857137 Email ID: dean.academiccourses@vistas.ac.in	Internal Member
6.	**Mr. V.Vinoth,** Assistant Professor	Department of Aviation VISTAS, Chennai. – 600117 Mob:8939650177 Email ID: space.aero99@gmail.com	Internal Member
7.	**Mrs.V.Umakarthika** Assistant Professor	Department of Aviation VISTAS, Chennai. – 600117 Mob.: 9626119989 Email ID: uma.karthikav@gmail.com	Internal Member

CREDIT DISTRIBUTION

B.Sc., (Hons) Aeronautical Science
Minimum credits to be earned: 176
B.Sc., Aeronautical Science
Minimum credits to be earned: 132

Component	I Sem	II Sem	III Sem	IV Sem	V Sem	VI Sem	3 Yrs. Total Credits	VII Sem	VIII Sem	4 Yrs Total Credits
DSC	8	8	8	8	12	16	60	12	12	84
AECC & Languages	4	4	4	7	-	-	19	-	-	19
DSE / IDC / Minor	4	4	3	4	3	4	22	4	4	30
MDC	3	3	3	-	-	-	9	-	-	9
MDE	-	-	2	-	-	-	2	-	-	2
VAC	2	1	-	1	2	-	6	-	-	6
SEC	2	2	2	2	2	-	10	-	-	10
SI	-	-	1	-	1	-	2	-	-	2
RP	-	-	-	-	-	2	2	6	6	14
Total Credits	23	22	23	22	20	22	132	22	22	176





ABBREVIATIONS

DSC	Disciplinary Specific Core
AECC	Ability Enhancement Compulsory Courses
DSE	Disciplinary Specific Elective
IDC	Interdisciplinary / Minor Courses
MDC	Multidisciplinary Courses
MDE	Multidisciplinary Elective
VAC	Value Added Courses
SEC	Skill Enhancement Courses
SI	Summer Internship
RP	Research Project

CURRICULUM STURCTURE

B.Sc., Aeronautical Science
Three Years
/
BSc., (Hons) Aeronautical Science
Four Years

Total number of Credits: 176

	B.Sc., Aeronautical Science (Hons) Minimum Credits to be earned :176 **B.Sc., Aeronautical Science Minimum Credits to be earned: 132**									
			Hours/Week					**Maximum Marks**		
SEMESTER 1										
Category	**Code**	**Course**	**L**	**T**	**P**	**O**	**C**	**CIA**	**SEE**	**Total**
LANG 1	24LTAM11/ 24LH1N11/ 24LFRE11	Tamil I / Hindi I/ French I	2	0	0	1	2	40	60	100
ENG 1	24LENG11	English I	2	0	0	1	2	40	60	100
DSC 1	24CBAR11	Elements of Aviation	3	0	0	2	3	40	60	100
DSC 2	24CBAR12	Fundamentals of Physics	4	0	0	2	4	40	60	100
MDC 1	24MBAR11	Mathematics	3	0	0	2	3	40	60	100
DSE 1/ IDC 1 / Minor 1	24DBAR11 / 24DBAR12	Discipline specific Elective-I	4	0	0	2	4	40	60	100
DSC 1	24PBAR11	Practical I- Physics Lab	0	0	2	1	1	40	60	100
VAC 1	24CSKU11	Communication Skills	2	0	0	1	2	-	100	100
SEC 1	24SSKU11	Soft Skills 1	2	0	0	1	2	40	60	100
SEC 2		Orientation programme / Industrial Visit	-	-	-	-	-	-	-	-
			22	**-**	**2**	**-**	**23**	**-**	**-**	**-**

CIA - Continuous Internal Assessment **SEE - Semester End Examination**

***L – Lecture, *T- Tutorial, *P- Practical, *O - Outside the class effort / self-study**

SEMESTER 2										
Category	**Code**	**Course**	**L**	**T**	**P**	**O**	**C**	**CIA**	**SEE**	**Total**
LANG 2	24LTAM21/ 24LH1N21/ 24LFRE21	Tamil II / Hindi II / French II	2	0	0	2	2	40	60	100
ENG 2	24LENG21	English II	2	0	0	2	2	40	60	100
DSC 3	24CBAR21	Aviation meteorology	3	0	0	2	3	40	60	100
DSC 4	24CBAR22	Familiarization of ATC and Airspace	3	0	0	2	3	40	60	100
MDC 2	24MBAR21	Principle of Management	3	0	0	2	3	40	60	100
DSE 2 / IDC 2 / Minor 2	24DBAR21 / 24DBAR22	Discipline specific Elective-II	4	0	0	2	4	40	60	100
DSC 3	24PBAR21	Practical II- Workshop Practices Lab	0	0	2	1	1	40	60	100
DSC 4	24PBAR22	Practical III- Aerodynamics Lab	0	0	2	1	1	40	60	100
VAC 2	24DVAC22	Universal Human Values	1	0	0	1	1	40	60	100
SEC 3	24SSKU21	Soft Skills 2	2	0	0	1	2	40	60	100
			20	**-**	**4**	**-**	**22**	**-**	**-**	**-**

SEMESTER 3										
Category	**Code**	**Course**	**L**	**T**	**P**	**O**	**C**	**CIA**	**SEE**	**Total**
LANG 3	24LTAM31/ 24LHIN31 /24LFRE31	Tamil III / Hindi III / French III	2	0	0	2	2	40	60	100
ENG 3	24LENG31	English III	2	0	0	2	2	40	60	100
DSC 5	24CBAR31	Radio Telephony Restricted	3	0	0	2	3	40	60	100
DSC 6	24CBAR32	General Navigation	3	0	0	2	3	40	60	100
MDC 3	24MBAR31	Non-Destructive testing	3	0	0	2	3	40	60	100
DSE 3 / IDC 3 / Minor 3	24DBAR31 / 24DBAR32	Discipline specific Elective-III	3	0	0	2	3	40	60	100
DSC 5	24PBAR31	Practical IV- Aircraft Component Drawing Lab	0	0	2	2	1	40	60	100
DSC 6	24PBAR32	Practical V- Aircraft Structures Lab	0	0	2	2	1	40	60	100
MDE 1		Indian Knowledge System	2	0	0	0	2	40	60	100
SEC 4	24SSKU31	Soft Skills 3	2	0	0	2	2	40	60	100
SI 1	24IBAR31	Internship I	0	0	2	1	1	-	100	100
			20	**-**	**6**	**-**	**23**	**-**	**-**	**-**

SEMESTER 4										
Category	**Code**	**Course**	**L**	**T**	**P**	**O**	**C**	**CIA**	**SEE**	**Total**
LANG 4	24LTAM41/ 24LHIN41 /24LFRE41	Tamil IV / Hindi IV / French IV	2	0	0	1	2	40	60	100
ENG 4	24LENG41	English IV	2	0	0	1	2	40	60	100
AECC 1	24EVS041	Environmental Studies	3	0	0	2	3	40	60	100
DSC 7	24CBAR41	Aircraft Instruments	3	0	0	2	3	40	60	100
DSC 8	24CBAR42	Air Regulation	3	0	0	2	3	40	60	100
DSE 4 / IDC 4 / Minor 4	24DBAR41 / 24DBAR42	Discipline specific Elective-IV	4	0	0	2	4	40	60	100
DSC 7	24PBAR41	Practical VI- Aircraft Maintenance Lab	0	0	2	1	1	40	60	100
DSC 8	24PBAR42	Practical VII- Propulsion Lab	0	0	2	1	1	40	60	100
SEC 5	24SBAR41	Industry Oriented Employability skills	1	0	2	1	2	40	60	100
VAC 3	24SNSS41	Yoga Education	0	0	2	1	1	-	100	100
SEC 6	24SBAR42	In-plant Training/ Industrial Tour/ Summer Term	-	-	-	-	-	-	-	-
			18	**-**	**8**	**-**	**22**	**-**	**-**	**-**

SEMESTER 5										
Category	**Code**	**Course**	**L**	**T**	**P**	**O**	**C**	**CIA**	**SEE**	**Total**
DSC 9	24CBAR51	Artificial Intelligence in Aviation	3	0	0	2	3	40	60	100
DSC 10	24CBAR52	Aircraft and Engine systems	3	0	0	2	3	40	60	100
DSC 11	24CBAR53	Airport and Airline passenger Management	4	0	0	2	4	40	60	100
DSE 5 / IDC 5 / Minor 5	24DBAR5--	Discipline specific Elective-V	3	0	0	2	3	40	60	100
DSC 9	24PBAR51	Practical VIII – Technical Seminar	0	0	2	2	1	40	60	100
DSC 10	24PBAR52	Practical IX-Aircraft simulator Lab	0	0	2	2	1	40	60	100
SEC 7	24SBAR51	Entrepreneurial Development	2	0	0	1	2	40	60	100
VAC 4	24DVAC51	Drone Operations and Safety Management	2	0	0	1	2	40	60	100
SI 2	24IBAR51	Internship II	0	0	2	1	1	-	100	100
SEC 8	24SBAR52	Skill Enhancement Training / Student Club Activities/ Institution Innovation Council Activities	-	-	-	-	-	-	-	-
			17	**-**	**6**	**-**	**20**	**-**	**-**	**-**

SEMESTER 6										
Category	**Code**	**Course**	**L**	**T**	**P**	**O**	**C**	**CIA**	**SEE**	**Total**
DSC 12	24CBAR61	Civil Aviation Requirements	3	0	0	2	3	40	60	100
DSC 13	24CBAR62	Flight Planning and Monitoring	4	0	0	2	4	40	60	100
DSC 14	24CBAR63	Aircraft loads and control	4	0	0	2	4	40	60	100
DSC 15	24CBAR64	Aircraft Structures and Composite Materials	4	0	0	2	4	40	60	100
DSE 6 / IDC 6 / Minor 6	24DBAR61 / 24DBAR62	Discipline specific Elective-VI	4	0	0	2	4	40	60	100
DSC 12	24PBAR61	Practical X – Flight planning Lab	0	0	2	2	1	40	60	100
SEC 9	24RBAR61	Mini Project	0	0	4	1	2	-	100	100
SEC 10		On Job Training / Apprenticeship / Startup	-	-	-	-	-	-	-	-
			19	**-**	**6**	**-**	**22**	-	**-**	**-**

SEMESTER 7										
Category	**Code**	**Course**	**L**	**T**	**P**	**O**	**C**	**CIA**	**SEE**	**Total**
DSC 16	24CBAR71	Aircraft Design	3	0	0	2	3	40	60	100
DSC 17	24CBAR72	Aviation Legislation	4	0	0	2	4	40	60	100
DSC 18	24CBAR73	Aircraft Maintenance Practices	4	0	0	2	4	40	60	100
DSE 7 / IDC 7 / Minor 7	24DBAR71 / 24DBAR72	Discipline specific Elective-VII	4	0	0	2	4	40	60	100
DSC 16	24PBAR71	Practical X- Aircraft Design Project I	0	0	2	2	1	40	60	100
RP 1	24RBAR71	Research Project I	0	0	12	2	6	40	60	100
			15	**-**	**14**	**-**	**22**	**-**	**-**	**-**

SEMESTER 8										
Category	**Code**	**Course**	**L**	**T**	**P**	**O**	**C**	**CIA**	**SEE**	**Total**
DSC 19	24CBAR81	Avionics	3	0	0	2	3	40	60	100
DSC 20	24CBAR82	Air Route Planning and Fleet Planning	3	0	0	2	3	40	60	100
DSC 21	24CBAR83	Airport And Airline Ground Operations	4	0	0	2	4	40	60	100
DSE 8 / IDC 8 / Minor 8	24DBAR81 / 24DBAR82	Discipline specific Elective-VIII	4	0	0	2	4	40	60	100
DSC 19	24PBAR81	Practical XI – Avionics Lab	0	0	2	2	1	40	60	100
DSC 20	24PBAR82	Practical XII – Aircraft Design Project II	0	0	2	2	1	40	60	100
RP 2	24RBAR81	Research Project II	0	0	12	2	6	-	60	100
			14	**-**	**16**	**-**	**22**	**-**	**-**	**-**

DISCIPLINE SPECIFIC CORE COURSES

Category	Code	Course	L	T	P	O	C
DSC 1	24CBAR11	Elements of Aviation	3	0	0	2	3
DSC 2	24CBAR12	Fundamentals of Physics	4	0	0	2	4
DSC 1 (Lab)	24PBAR11	Physics Lab	0	0	2	1	1
DSC 3	24CBAR21	Aviation Meteorology	3	0	0	2	3
DSC 4	24CBAR22	Familiarization Of ATC and Airspace	3	0	0	2	3
DSC 2 (Lab)	24PBAR21	Workshop Practices-Lab	0	0	2	2	1
DSC 3 (Lab)	24PBAR22	Aerodynamics Lab	0	0	2	1	1
DSC 5	24CBAR31	Radio Telephony Restricted	3	0	0	2	3
DSC 6	24CBAR32	General Navigation	3	0	0	2	3
DSC 4 (Lab)	24PBAR31	Aircraft Component Drawing Lab	0	0	2	2	1
DSC 5 (Lab)	24PBAR32	Aircraft Structures Lab	0	0	2	2	1
DSC 7	24CBAR41	Aircraft Instruments	3	0	0	2	3
DSC 8	24CBAR42	Air Regulation	3	0	0	2	3
DSC 6 (Lab)	24PBAR41	Aircraft Maintenance Lab	0	0	2	1	1
DSC 7 (Lab)	24PBAR42	Propulsion Lab	0	0	2	1	1
DSC 9	24CBAR51	Artificial Intelligence in Aviation	3	0	0	2	3
DSC 10	24CBAR52	Aircraft and Engine Systems	3	0	0	2	3
DSC 11	24CBAR53	Airport and Airline Passenger Management	4	0	0	2	4
DSC 8 (Lab)	24PBAR51	Technical Seminar	0	0	2	2	1
DSC 9 (Lab)	24PBAR52	Aircraft Simulator Lab	0	0	2	2	1
DSC 12	24CBAR61	Civil Aviation Requirements	3	0	0	2	3
DSC 13	24CBAR62	Flight Planning and	4	0	0	2	4

		Monitoring					
DSC 14	24CBAR63	Aircraft Loads and Control	4	0	0	2	4
DSC 15	24CBAR64	Aircraft Structures and Composite Materials	4	0	0	2	4
DSC 10 (Lab)	24PBAR61	Flight Planning Lab	0	0	2	2	1
DSC 16	24CBAR71	Aircraft Design	3	0	0	2	3
DSC 17	24CBAR72	Aviation Legislation	4	0	0	2	4
DSC 18	24CBAR73	Aircraft Maintenance Practices	4	0	0	2	4
DSC 11 (Lab)	24PBAR71	Aircraft Design Project I	0	0	2	2	1
DSC 19	24CBAR81	Avionics	3	0	0	2	3
DSC 20	24CBAR82	Air Route Planning and Fleet Planning	3	0	0	2	3
DSC 21	24CBAR83	Airport And Airline Ground Operations	4	0	0	2	4
DSC 12 (Lab)	24PBAR81	Avionics Lab	0	0	2	2	1
DSC 12 (Lab)	24PBAR82	Aircraft Design Project II	0	0	2	2	1

DISCIPLINE SPECIFIC ELECTIVE COURSES

Category	Code	Course	L	T	P	O	C
DSE 1	24DBAR11	Basic Electrical Fundamentals	4	0	0	2	4
	24DBAR12	Air Traffic Control	4	0	0	2	4
DSE 2	24DBAR21	Principle of Flight	4	0	0	2	4
	24DBAR22	Industrial Aerodynamics	4	0	0	2	4
DSE 3	24DBAR31	Radio Navigation	3	0	0	2	3
	24DBAR32	Aerodynamics of Drones	3	0	0	2	3
DSE 4	24DBAR41	Aerospace Propulsion	4	0	0	2	4
	24DBAR42	Design Of UAV Systems	4	0	0	2	4
DSE 5	24DBAR51	Aircraft Performance and Stability	3	0	0	2	3
	24DBAR52	Wind Tunnel Techniques	3	0	0	2	3
		Cyber Security	3	0	0	2	3
DSE 6	24DBAR61	Aero Engine Maintenance and Repair	4	0	0	2	4
	24DBAR62	Aerospace Materials	4	0	0	2	4
DSE 7	24DBAR71	Dangerous Goods and Cargo	4	0	0	2	4
	24DBAR72	Airframe Maintenance and Repair	4	0	0	2	4
DSE 8	24DBAR81	Airline Operations Control Centre	4	0	0	2	4
	24DBAR82	Piston Engine and Propellor	4	0	0	2	4

AECC & LANGUAGES

Category	Code	Course	L	T	P	O	C
LANG 1	24LTAM11/ 24LHIN11/ 24LFRE11	Tamil I / Hindi I/ French I	2	0	0	1	2
ENG 1	24LENG11	English I	2	0	0	1	2
LANG 2	24LTAM21/ 24LHIN21/ 24LFRE21	Tamil II / Hindi II / French II	2	0	0	2	2
ENG 2	24LENG21	English II	2	0	0	2	2
LANG 3	24LTAM31/ 24LHIN31/ 24LFRE31	Tamil III / Hindi III / French III	2	0	0	2	2
ENG 3	24LENG31	English III	2	0	0	2	2
LANG 4	24LTAM41/ 24LH1N41/ 24LFRE41	Tamil IV/Hindi IV/French IV	2	0	0	2	2
ENG 4	24LENG41	English-IV	2	0	0	2	2
AECC 1	24EVS031	Environmental Studies	3	0	0	2	3

MULTIDISCIPLINARY COURSES

Category	Code	Course	L	T	P	O	C
MDC 1	24MBAR11	Mathematics	3	0	0	2	3
MDC 2	24MBAR21	Principle of Management	3	0	0	2	3
MDC 3	24MBAR31	Non-Destructive Testing	3	0	0	2	3

MULTIDISCIPLINARY COURSES

Category	Code	Course	L	T	P	O	C
MDE 1		Indian Knowledge System	2	0	0	2	2

VALUE ADDED COURSES

Category	Code	Course	L	T	P	O	C
VAC 1	24DVAC11	Communication Skills	2	0	0	1	2
VAC 2	24DVAC21	Universal Human Values	1	0	0	1	1
VAC 3	24SNSS41	Yoga Education	0	0	2	1	1
VAC 4	24DVAC51	Drone Operations and Safety Management	2	0	0	1	2

SKILL ENHANCEMENT COURSES

Category	Code	Course	L	T	P	O	C
SEC 1	24SSKU11	Soft Skills I	2	0	0	1	2
SEC 2	24SBAR11	Orientation Programme / Industrial Visit	-	-	-	-	-
SEC 3	24SSKU21	Soft Skills II	2	0	0	1	2
SEC 4	24SSKU31	Soft Skills III	2	0	0	2	2
SEC 5	24SBAR41	Industry Oriented Employability skills	1	0	2	1	2
SEC 6	24SBAR42	In-plant Training/ Industrial Tour/ Summer Term	-	-	-	-	-
SEC 7	24SBAR51	Entrepreneurial Development	2	0	0	1	2
SEC 8	24SBAR52	Skill Enhancement Training / Student	-	-	-	-	-

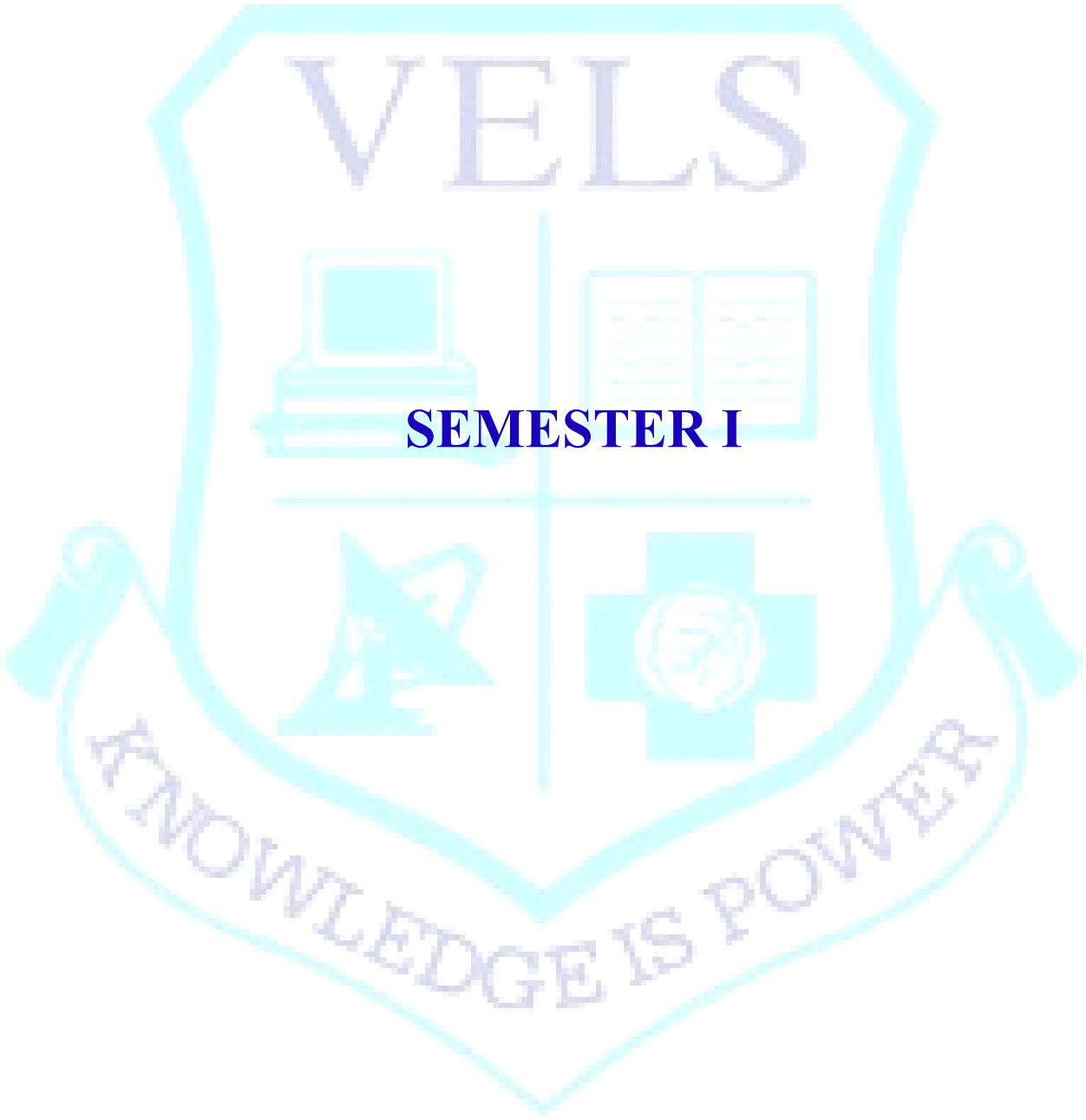
		Club Activities/ Institution Innovation Council Activities					
SEC 9	24RBAR61	Mini Project	2	0	0	2	2
SEC 10	24SBAR62	On Job Training / Apprenticeship / Startup	-	-	-	-	-

SUMMER INTERNSHIP

Category	Code	Course	L	T	P	O	C
SI 1	24IBAR31	INTERNSHIP-I	0	0	2	1	1
SI 2	24IBAR51	INTERNSHIP-II	0	0	2	1	1

RESEARCH PROJECT

Category	Code	Course	L	T	P	O	C
RP 1	24RBAR71	Research Project I	0	0	12	2	6
RP 2	24RBAR81	Research Project II	0	0	12	2	6



SEMESTER I

24LTAM11 **TAMIL-I**

L	T	P	O	C
2	0	0	1	2

மொழிவரலாறு – சங்க இலக்கியம் – அற இலக்கியம் – மொழித்திறன்

பாடத்திட்ட நோக்கம்:

மாணவர்களின் இலக்கிய நாட்டத்தை மேம்படுத்துதல், தற்கால தமிழ் இலக்கிய வகைமைகளான மரபுக்கவிதை, புதுக்கவிதை, உரைநடை ஆகியவற்றை அறிமுகப்படுத்துதல், தமிழர்தம் வாழ்வியல் நெறிகளையும் பண்பாட்டுச் செழுமைகளையும் இன்றைய தலைமுறையினர் அறியச் செய்தல், மாணவர்களுக்குத் தமிழைத் தவறின்றி எழுதுவதற்குத் தேவையான பயிற்சி அளித்து அவர்களின் மொழித்திறனை மேம்படுத்துதல், செய்யுளின் நலத்தைப் பாராட்டும் முறைமையை அறியச் செய்து அதன்வழி சிந்தனை வளத்தைப் பெருகச் செய்தல் என்பனவும் மேற்கண்டவழி மாணவர்களை ஆளுமை மிக்கவர்களாக உருவாக்கி, போட்டித்தேர்வுகளுக்குத் தயார் செய்து அவர்களுக்கு வேலைவாய்ப்பை உருவாக்குவதும் இந்தப் பாடத்திட்டத்தின் முக்கிய நோக்கமாகும்.

அலகு- 1: தமிழ் மொழி வரலாறு 8மணி நேரம்

மொழிக்குடும்பம் - இந்திய மொழிக்குடும்பங்கள் - இந்திய ஆட்சி மொழிகள் - திராவிட மொழிக்குடும்பங்கள் - திராவிட மொழிகளின் வகைகள் –திராவிட மொழிகளின் சிறப்புகள் - திராவிட மொழிகளின் வழங்கிடங்கள் - திராவிட மொழிகளுள் தமிழின் இடம் - தமிழ்மொழியின் சிறப்புகள் - தமிழ் பிறமொழித் தொடர்புகள்.

அலகு -2 8 மணி நேரம்

புறநானூறு- பாடல் எண்: , 182, 183, – இரண்டு பாடல்கள்.

குறுந்தொகை- பாடல் எண்: 2, 167, - இரண்டு பாடல்கள்

பரிபாடல் - முருகன். வையை - இரண்டு பாடல்கள்

அலகு - 3 அற இலக்கியங்கள்

திருக்குறள்- வான்சிறப்பு (அறம்), பெருமை (பொருள்), பிரிவாற்றாமை (இன்பம்),. மூன்று அதிகாரங்கள் முழுமையும்

1. நாலடியார் - இரண்டு பாடல்கள். (2, 3)
2. மூதுரை - இரண்டு பாடல்கள். (2, 8)

அலகு 4 மொழி 07 மணி நேரம்

பிழை நீக்கி எழுதுதல் - ஒற்றுப்பிழை நீக்கி எழுதுதல் - தொடர்பிழை நீக்கி எழுதுதல் - ஒற்று மிகும் இடங்கள் - ஒற்று மிகா இடங்கள் - பிற மொழிச் சொற்களை நீக்கி எழுதுதல் – பயிற்சிகள்.

மொத்தம்: 30 மணி நேரம்

பார்வை நூல்கள்

1. தமிழர் நாகரிகமும் பண்பாடும், டாக்டர் அ. தட்சிணாமூர்த்தி, ஐந்திணைப் பதிப்பகம், 2001.
2. தவறின்றித் தமிழ் எழுதுவோம், மா. நன்னன், ஏகம் பதிப்பகம், 1999.
3. தவறின்றித் தமிழ் எழுத - மருதூர் அரங்கராசன், ஐந்திணைப் பதிப்பகம், 2003.
4. தமிழ் இலக்கிய வரலாறு, வரதராசன், மு., புது தில்லி : சாகித்திய அக்காதெமி, 2002.
5. புதிய தமிழ் இலக்கிய வரலாறு, நீல. பத்மநாபன், சிற்பி பாலசுப்ரமணியம், சாகித்திய அகாடெமி, 2007.
6. செம்மொழி தமிழின் சிறப்பியல்புகள் - முனைவர் மறைமலை இலக்குவனார்; https://www.youtube.com/watch?v=HHZnmJb4jSY
7. பாடநூல் தேடலுக்கான இணையம் - https://archive.org/

24LHIN11 **HINDI-I**

L	T	P	O	C
2	0	0	1	2

Course Objectives :

- To understand the rural life style, social responsibilities and social values
- To create awareness about the importance of varied culture
- To enable the students to develop communication skill in Hindi and to use Azhagi, Azhagi+ fonts

UNIT I : पं.श्रीराम शर्मा कृत 'स्मृति' (कहानी)
'Smruti' (Kahani) by Pandit Sriram Sharma. 6hrs.

UNIT II : शरद जोशी कृत 'अतिथि तुम कब जावोगे' (व्यंग्य)
'Athiti tum kab jaaoge' (Vyangy) by Sharad Joshi. 6hrs.

UNIT III: राहुल सांस्कृतयायन कृत 'अथातो घुमक्कड़ जिज्ञासा' (यात्रा वृत्तान्त)
'Atatho Ghumakkad Jigyasa' (Yatra Vruthanth) by Rahul Sanskrityayan. 6hrs.

UNIT IV: व्यावहारिक हिन्दी- पत्र लेखन में प्रयुक्त वाक्यांश, कौशल विकास – भाव एक भाषा अनेक 6hrs.
Functional Hindi-Phrases used in Letter Writing.
Skill development - Bhav Ek Bhasha Anek

UNIT V : पत्र लेखन – परिचय व प्रकार, 3 अनोपचारिक पत्र
अलगी, अलगी + फ़ॉन्ट का परिचय
Letter Writing- Intro. & Types & 3 Personal Letters 6hrs.
Introduction to Azhagi, Azhagi + fonts

Total: 30hrs.

Course Outcome:
At the end of this course Students will be able to
CO1 Gain knowledge about the rural life style
CO2 Understand social values
CO3 Understand importance of varied culture
CO4 Journalise in Functional Hindi
CO5 Use Azhagi, Azhagi+ fonts

Text Books:
Pandit Shriram Sharma, Shikaar, Sahitya Sadan, 1932.
Sharad Joshi, Yatha Sambhav, Bharatiya Gyanpeet, 2014.
Rahul Sanskrityayan, Ghumakkad Shastra, Rajkamal Prakashan, 1949.

Reference Book:
Kendriya Hindi Sansthan, Banking Hindi Patyakram, 2012.
NCERT, Sparsh, Class 9.
Main Aur Mera Vyakaran, New Saraswati House, New Delhi.
Govind Ballabh Sharma, Hindi Vyavaharik Tankan Kala Evam Tankan Abhyas, Neelkanth Publishers Pvt. Ltd., 2022.

Weblinks :
Pandit Sriram Sharma ka kahani: https://www.evidyarthi.in
Harishankar parasayi ka Vyangy: http://gadyakosh.org
Rahul Sanskrityayan ka yatravruttant: https://www.hindwi.org
Prayojanmoolak Hindi:https://hi.mwikipedia.org
https://www.azhagi.com/hnd/helphtml/Introduction.html

24LFRE11 **FRENCH-I**

L	T	P	O	C
2	0	0	1	2

COURSE OBJECTIVES:

The lessons are being chosen:

- To greet, to express excuse and to introduce oneself
- To introduce another person
- To express his/her ideas, opinions and weekend projects
- To request someone to do something, polite manners
- To accept, refuse, enquire and indicate the time and date
- To express himself / herself in positive and negative manner

UNIT I SALUT **4 HOURS**

- les nombres, Les jours de la semaine et du mois, La nationalité

UNIT II ENCHANTÉ **6 HOURS**

- Les verbes Etre, Avoir, Aller, Regular ER verbes, Present tense

UNIT III J'ADORE **4 HOURS**

- La negation, l'adjectif possessif, le futur proche

UNIT IV TU VEUX BIEN **7 HOURS**

- Les articles de finis/indéfinis, Les pronoms après une préposition (avec lui, chez moi), Le passé composé

UNIT V ON SE VOIT QUAND **5 HOURS**

- Les pronoms compléments directs me, te, nous, vous, L'interrogation avec est-ce que, L'heure et la date.

UNIT VI BONNE IDÉE **4 HOURS**

- Les articles partitifs, Le masculin et le féminin des adjectifs, Les pronoms compléments directs le, la, les, La négation : ne… pas de.

TOTAL 30 HOURS

COURSE OUTCOMES:

1) The students would be able to greet, to excuse and to introduce himself
2) The students would be able to introduce someone
3) The students would be able to express his ideas, opinions and weekend projects
4) The students would be able to ask someone to do something, polite manner
5) The students would be able to accept, refuse enquire and indicate the time and date
6) The students would be able to express himself in positive and negative manner

REFERENCES:

1. LATITUDES 1 (A1/A2) MÉTHODE DE FRANÇAIS - Régine Mérieux and Yves Loiseau
2. SAISON A1 - MÉTHODE DE FRANÇAIS - Marie-Noëlle Cocton, Élodie Heu, Catherine Houssa, Émilie Kasazian

24LENG11 **ENGLISH-I**

L	T	P	O	C
2	0	0	1	2

COURSE OBJECTIVES:

- To enable students to develop their communication skills effectively.
- To make students familiar with usage skills in the English Language.
- To enrich their vocabulary in English.
- To develop communicative competence.

UNIT I PROSE **6 HOURS**

- Dangers of drug abuse - Hardin B.Jones
- Tight corners - E.V.Lucas

UNIT II POETRY **6 HOURS**

- Ecology - A.K.Ramanujan
- The owl and the chimpanzee - Jo Camacho

UNIT III SHORT STORY **6 HOURS**

- The Dear Departed - Stanley Houghton
- The Fool's Paradise- Isaac Bashevis Singer

UNIT IV GRAMMAR **6 HOURS**

- Parts of speech, Articles

UNIT V GRAMMAR **6 HOURS**

- One-word substitution, prefix, suffix, synonym, antonym

TOTAL 30 HOURS

COURSE OUTCOMES:

Upon completion of this course, the students will be able to

CO1: Understand the characteristic features of the language used in the text.

CO2: Strengthen their knowledge of basic grammar

CO3: Improve narrative skills after studying diverse prose and play.

CO4: Understand to classify parts of speech and articles.

CO5: Develop critical writing skills in the textual content of the syllabus.

REFERENCES:

1. English for Communication Enrichment: by Jeya Santhi June 2015.
2. Dr. M. Narayana Rao and Dr. B. G.Barki–Anu's Current English for Communication (AnuChitra). June 2012.
3. Dr. Ananthan, R. Effective Communication. Ed. Chennai: Anu Chithra Pub.2010.

24CBAR11 **ELEMENTS OF AVIATION**

L	T	P	O	C
3	0	0	2	3

COURSE OBJECTIVES:

To acquire the knowledge on the Historical evolution of aviation and to learn the various stake holders in civil aviation

UNIT I HISTORY OF AVIATION 9 HOURS

Evolution of Aviation – Early stage and Later stage - International conventions: Paris Convention - Chicago Convention – International Civil Aviation Organization and Annexures –Freedom of air – Phonetic Alphabet & Terminology – Introduction to World Time zone - Development of Air transportation in India

UNIT II INTRODUCTION TO AIRCRAFT SCIENCE 9 HOURS

History of Aircraft – Difference between Aircraft and Airplane – Aircraft Manufacturers – Classification of Airplanes – Classification and Parts of an Aircraft – definitions – Basic Science behind the Flight – Mechanics of the Flight.

UNIT III STAKE HOLDERS IN CIVIL AVIATION 9 HOURS

Airport – Classification: Organizational structure and functions – Airline industry: Air Operator Certificate, Non-scheduled Operator's Permit, classification, Permits and approval, Basic operation models, Hub and Spoke, Commercial Airlines, Military aviation, General Aviation – Aerospace Company: Design, Manufacturing and Maintenance – Maintenance, repair and overhaul: Aircraft Maintenance - Organization Structure – Air Traffic Control: organizational structure - Roles, Air Traffic Control units, Functions, Controlled Aerodrome – Ground Handling Agent: Roles and Functions

UNIT IV REGULATORY BODIES IN AVIATION 9 HOURS

International Civil Aviation Organization – International Air Transport Association – Ministry of Civil Aviation – Directorate General of Civil Aviation – Aircraft Accident Investigation Bureau – Bureau of Civil Aviation Security and Central Industrial Security Force – Airport Authority of India. – Other regulatory bodies European Union Aviation Safety Agency, Federal Aviation Administration - Introduction, Responsibility and Functions.

UNIT V AIRCRAFT INCIDENTS AND ACCIDENTS INVESTIGATION 9 HOURS

Case studies and practical exercises on Air crash investigation – Introduction to Accident Investigation – Investigation techniques and methodology – Human factors in Accident investigation - Technical aspects of air crash investigation – Legal and ethical aspects

TOTAL: 45 HOURS

COURSE OUTCOMES:

Upon completion of this course, the students will be able to

CO1: Illustrate the history of aviation & developments over the years

CO2: Gain knowledge on aircraft basic science

CO3: Explain the various stake holders in aviation

CO4: Explain the various regulatory bodies in aviation

CO5: Illustrate the air crash investigation

TEXT BOOKS:

1. Graham.A, "Managing Airport an International Perspective", Butterworth Heinemann, Oxford- 2001.

2. Wells.A, "Airport Planning and Management", 4th Edition-McGraw-hill, London-2000.

3. IATA Ground Operations Manual.

REFERENCES:

1. Richard De Neufville, "Airport Systems: Planning, Design, and Management" , McGraw-Hill, London2007

2. Edissa Uwayo, "Airline and Airport Operations", Notion Press; 1st edition (23 September 2016)

WEB LINKS:

1. https://www.iata.org/en/training/courses/airline-industry-introduction/talg50hlm/en/.

24CBAR12 FUNDAMENTALS OF PHYSICS

L	T	P	O	C
4	0	0	2	4

COURSE OBJECTIVES:

To make the students to understand, the elasticity of a material and different kinds of moduli; surface tension and viscosity of fluids; transmission of heat via Conduction, Radiation process involved in thermal physics; properties of sound using experimental methods and principles of electricity and its conversion into ammeter and voltmeter.

UNIT I ELASTICITY AND BENDING MOMENT 12 HOURS

Hooke's law - Elastic moduli - Work done in stretching and work done in twisting a wire - Twisting couple on a wire - Determination of rigidity modulus of a wire using torsion pendulum - Expression for bending moment - Uniform bending - Experiment to determine young's modulus using pin and microscope method.

UNIT II FLUIDS 12 HOURS

Surface Tension: Definitions - Expression for surface tension of a liquid by capillary rise method - Viscosity: Poiseuille's formula for rate of flow of liquid in a capillary tube by dimensions - Analogy between current flow and liquid flow - streamlined motion – Stoke's formula.

UNIT III THERMAL PHYSICS 12 HOURS

Conduction in solids: Thermal conductivity - Lee's disc method - Wiedemann-Franz law - Convection: Newton's law of cooling – Radiation: Distribution of energy in the spectrum of a black body – Planck's law of radiation (no derivation) and its deduction.

UNIT IV SOUND 12 HOURS

Simple harmonic motion: free, damped, forced vibrations and resonance - Intensity and loudness of sound - Decibels – Melde's string experiment – Determination of frequency of tuning fork - Acoustics of buildings: Reverberation time - Sabine's formula.

UNIT V ELECTRICITY 12 HOURS

Current and Current density – Ohm's law - Resistors - I-V characteristics - color coding- conversion of galvanometer into an ammeter and voltmeter – Kirchhoff's laws – Balance condition of Wheatstone's bridge - Potentiometer – Measurement of potential difference and current.

TOTAL: 60 HOURS

COURSE OUTCOMES:

At the end of this course the students will be able to,

CO1: Understand the bending of beams under different loading conditions.

CO2: Demonstrate the rate of flow of liquid in a capillary tube.

CO3: Identify the good and bad conductors and concepts of blackbody radiation and their applications.CO4: Analyze acoustic properties of typically used materials for design consideration.

CO5: Illustrate Kirchhoff's law and analyze circuit diagram.

TEXT BOOKS:

1. Properties of Matter: R. Murugeshan, S Chand & Co. Pvt. Ltd., New Delhi
2. Heat and thermodynamics: D S Mathur, S Chand & Co., New Delhi.
3. Text book of Sound by M N Srinivasan – Himalaya Publications, 1991.
4. Electricity & Magnetism by K K Tewari, S Chand & Co., 3rd Edition, 2001

REFERENCE BOOKS:

1. Fundamentals of Physics, 6th Edition by D Halliday, R Resnick and J Walker, Wiley NY 2001.
2. C. J. Smith - General Properties of Matter, Orient & Longman Publishers, 1960.

WEB LINKS:

1. https://www.youtube.com/watch?v=74pm8A0RJ-0
2. https://www.youtube.com/watch?v=fa0zHI6nLUo&list=PLbMVogVj5nJTZJHsH6uLCO00I- ffGyBEm
3. https://www.youtube.com/watch?v=Lzrjqy4PImE
4. Gm0yRYwTgNH_J_73OAyrskU659k64I

24MBAR11 **MATHEMATICS**

L	T	P	O	C
3	0	0	2	3

COURSE OBJECTIVES:

- To learn various concept in matrix.
- To apply the concept of Sets topromote critical thinking, problem-solving technique and interdisciplinary connections.
- To analyse the relationships, decisions making and modeling complex systems using Partial Order Relations

UNIT I MATRICES & DETERMINANTS 9 HOURS

Matrices: Definition, Types of Matrices, Addition, Subtraction, Scalar Multiplication and Multiplication of Matrices, Adjoint, Inverse, Cramer's Rule, Rank of Matrix Dependence of Vectors**. Determinants:** Definition, Minors, Cofactors, Properties of Determinants

UNIT II SETS 9 HOURS

Sets: Sets, Subsets, Equal Sets Universal Sets, Finite and Infinite Sets, Operation on Sets, Union, Intersection and Complements of Sets, Cartesian Product, Cardinality of Set, Simple Applications.

UNIT III RELATIONS & FUNCTIONS 9 HOURS

Relations: Properties of Relations, Equivalence Relation. **Functions:** Partial Order Relation Function: Domain and Range, Onto, Into and One to One Functions, Composite and Inverse Functions,

UNIT IV PARTIAL ORDER RELATIONS 9 HOURS

Partial Order Sets, Representation of POSETS using Hasse diagram, Chains, Maximal and Minimal Point, GLB, LUB.

UNIT V NUMBER SYSTEM AND CONVERSIONS 9 HOURS

Number Systems: Binary Numbers, Octal Numbers, Decimal numbers, Hexa Decimal numbers. **Number base conversions**: Octal and Hexa Decimal Numbers - Complements - Signed Binary Numbers - Binary Arithmetic - Binary Codes - Decimal Code

TOTAL: 45 HOURS

COURSE OUTCOMES:

At the end of this course the students will be able to,

CO1: Apply the concept of Matrix and solving simultaneous equations

CO2: Understand the ideas of Sets and its applications.

CO3: Identify the relations for various functions .

CO4: Apply the concept of partial order relation for various sets.

CO5: Understand the conversion of various number system.

TEXT BOOKS:

1. Kolman, Busby, Ross and Rehman, Discrete Mathematical Structures for Computer Science, Pearson Education, 5th Edition, 2003.

REFERENCE BOOKS:

1. D.S. Malik and M.K. Sen, Discrete Mathematical Structures: Theory and Applications, Thomson, 2004.
2. Goodaire&Parmenter : Discrete Mathematics & Graph Theory, Pearson Education, 2000.
3. Kenneth H. Rosen, Discrete Mathematics and its Applications, Tata McGraw Hill, 5th Ed., 2004.
4. C.L. Liu, Elements of Discrete Mathematics, 2nd Edition, McGraw Hill, 1986..

WEB LINKS:

1. https://www.geeksforgeeks.org/mathematics-partial-orders-lattices/
2. https://www.ipsgwalior.org/download/number%20system.pdf

24PBAR11 **PHYSICS LAB**

L	T	P	O	C
0	0	2	1	1

COURSE OBJECTIVES:

- To enable the student to explore the field of properties of matter and electricity.
- To gain knowledge in the scientific methods and learn the process of measuring differentPhysical variables.

Exp no	EXPERIMENTS	Number Of Hours
1	Young's modulus by uniform bending - Pin and Microscope.	3
2	Young's modulus by non-uniform bending - Pin and Microscope.	3
3	Rigidity modulus - torsion pendulum	3
4	Coefficient of viscosity of a liquid – Poiseuille's method	3
5	Thermal conductivity of a bad conductor - Lee's disc method.	3
6	Coefficient of viscosity of a liquid – Stoke's method	3
7	Surface tension of water - capillary rise method	3
8	Ultrasonic Interferometer	3
9	Sonometer-Frequency of Tuning Fork	3
10	Compound Pendulum.	3
	TOTAL 30 HOURS	

COURSE OUTCOMES:

At the end of this course the students will be able to,

CO1: Calculate the Young's modulus of the material.

CO2: Estimate the parameters associated with torsional oscillation.

CO3: Analyze the coefficient of viscosity at different pressure head.

CO4: Measure the acceleration due to gravity.

CO5: Determine the velocity and compressibility of the given liquid.

REFERENCES:

1. C. C. Ouseph, U. J. Rao, V. Vjiayendran, Practical Physics,1st Edition, 2015.

24DVAC21 **COMMUNICATION SKILLS**

L	T	P	O	C
2	0	0	1	2

COURSE OBJECTIVES:

- To develop effective verbal and non-verbal communication techniques for variouscontexts.
- To enhance listening skills for better comprehension and engagement in conversations.
- To improve written communication abilities, focusing on clarity, coherence, and style.
- To build confidence in public speaking through practice and constructive feedback.
- To cultivate interpersonal skills for successful collaboration and professional interactions.

UNIT I INTRODUCTION TO COMMUNICATION SKILLS 6 HOURS

- Fundamentals of Communications
- Elements of Communication, Types of Communication

UNIT II PRACTICAL ENGLISH 6 HOURS

- Importance of the language - Word Usage and Jargon
- Tenses and the effectiveness - Basics of grammar (Noun/Verb/Adverb/Conjunction)

UNIT III EFFECTIVE COMMUNICATION 6 HOURS

- LSRW (Listening, Speaking, Reading & Writing)
- Pronunciation - Vocabulary Building
- Intonations & its importance

UNIT IV WORKPLACE COMMUNICATION 6 HOURS

- Basics of telephone etiquette
- E-Mail writing
- Presentation Skills
- Interpersonal Skills
- Business English

UNIT V QUANTITATIVE ABILITY 6 HOURS

- Verbal Ability - Verbal Analogy
- Debating Skills - Public Speaking

TOTAL 30 HOURS

COURSE OUTCOMES:

Upon completion of this course, the students will be able to

CO1 Demonstrate basic etiquette in various personal and professional settings.

CO2 Effectively manage stress using learned techniques.

CO3 Show increased self-awareness and make informed decisions.

CO4 Understand and articulate key 21st-century skills.

CO5 Apply creativity and critical thinking to solve problems innovatively.

REFERENCES:

1. Alex, Dr. K. (2014). Soft Skills (1st edition) S Chand & Company
2. Taylor. Grant English Conversation Practice. Tata McGraw Hill Education Pvt. Ltd 2005
3. Tiko, Champa& Jaya Sasikumar. Writing with a purpose. OUP New Delhi 1979
4. Nelson-Jones, R. (1992). Life skills, a handbook, Trowbridge, Wilts: Detesios Ltd.
5. Tuhovsky, Ian (2019). Communication Skills Training (2nd edition) Rupa Publication India.

24SSKU11 **SOFT SKILLS -I**

L	T	P	O	C
2	0	0	1	2

COURSE OBJECTIVES:

- To learn and apply basic etiquette for personal and professionalinteractions.
- To develop effective stress management techniques for maintaining mental and emotional well-being.
- To enhance self-awareness for personal growth and informed decision-making.
- To gain an overview of essential 21st-century skills necessary for success in a rapidlychanging world.
- To foster creativity and critical thinking skills for innovative problem-solving andadaptability.

UNIT I INTRODUCTION TO SOFT SKILLS 6 HOURS

- Soft Skills vs Hard Skills
- 15 important Soft Skills
- Communication Skills, Time Management, Leadership Skills

UNIT II OVERVIEW OF 21ST CENTURY SKILLS. 6 HOURS

- Lateral Thinking – Left Brain/Right Brain Functionality
- Problem solving skills

UNIT III SELF AWARENESS 6 HOURS

- Human Values
- Mindfulness
- SWOT Analysis
- PDCA Approach

UNIT IV CREATIVITY/CRITICAL THINKING 6 HOURS

- Six Thinking Traits
- Creative writing exercises
- Open mindedness

UNIT V PERSONAL HYGIENE AND STRESS MANAGEMENT 6 HOURS

- Basic Etiquettes
- Health and Personal Grooming
- Stress-meaning and nature, Eustress, Distress
- Stress management strategies

TOTAL 30 HOURS

COURSE OUTCOMES:

Upon completion of this course, the students will be able to

CO1 Demonstrate basic etiquette in various personal and professional settings.

CO2 Effectively manage stress using learned techniques.

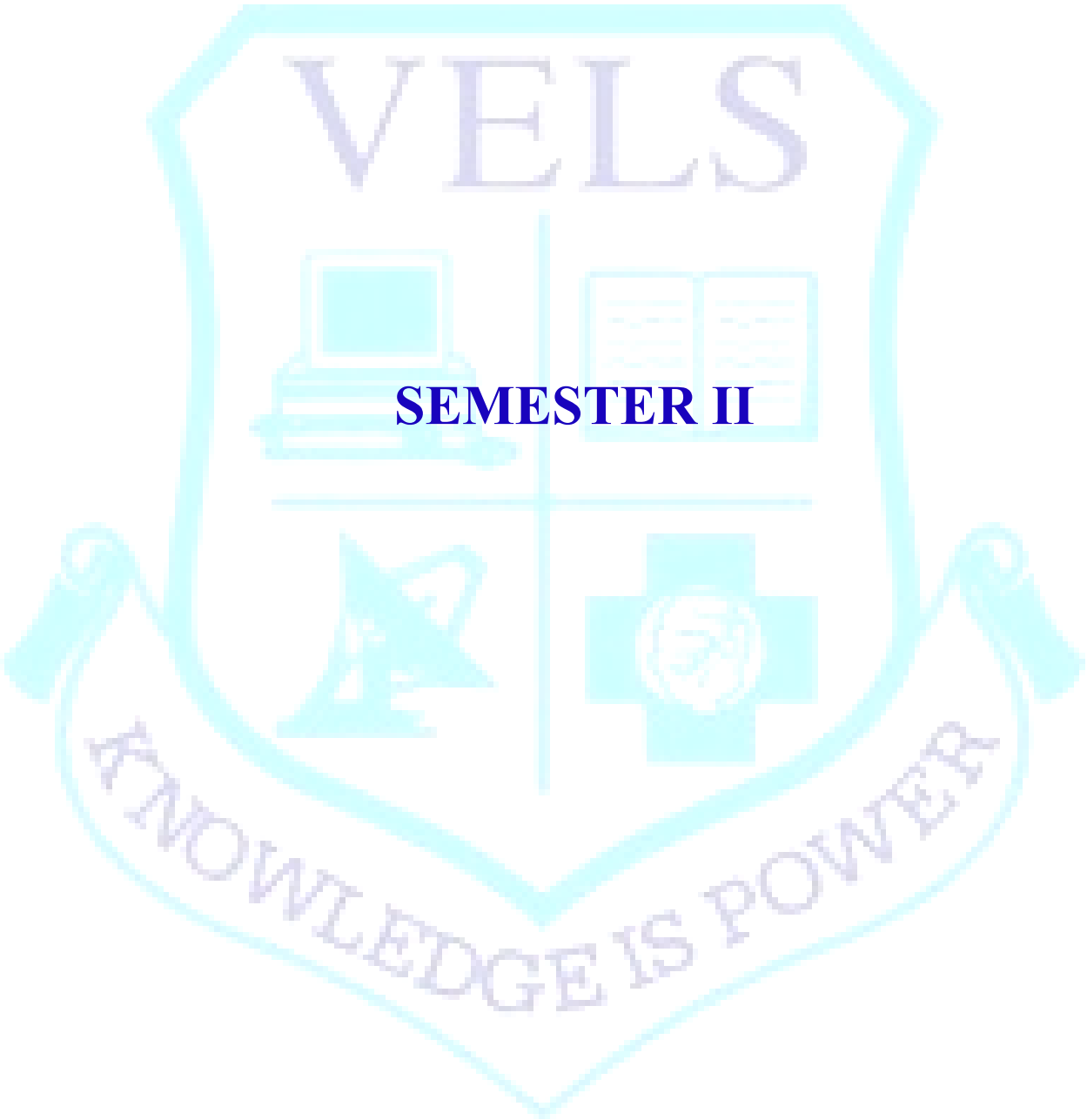
CO3 Show increased self-awareness and make informed decisions.

CO4 Understand and articulate key 21st-century skills.

CO5 Apply creativity and critical thinking to solve problems innovatively.

REFERENCES:

1. Alex, Dr. K. (2014). Soft Skills (1st edition) S Chand & Company
2. Taylor. Grant English Conversation Practice. Tata McGraw Hill Education Pvt. Ltd 2005
3. Tiko, Champa& Jaya Sasikumar. Writing with a purpose. OUP New Delhi 1979
4. Nelson-Jones, R. (1992). Life skills, a handbook, Trowbridge, Wilts: Detesios Ltd.
5. Tuhovsky, Ian (2019). Communication Skills Training (2nd edition) Rupa Publication India.



SEMESTER II

24LTAM21 **TAMIL-II**

L	T	P	O	C
2	0	0	2	2

காப்பியம், பக்தி இலக்கியம், கலைகள், நாகரிகம்-பண்பாடு

பாடத்திட்ட நோக்கம்:

மாணவர்களின் இலக்கிய நாட்டத்தை மேம்படுத்துதல், அற இலக்கியங்கள், சிற்றிலக்கியம், சிறுகதை ஆகியவற்றை அறிமுகப்படுத்துதல், தற்காலப் பேச்சுத் தமிழ் எழுத்துத்தமிழ் ஆகியவற்றின் வளர்நிலைகளை மாணவர்களை அறியச் செய்தல், அதன்வழி சிந்தனை வளத்தைப் பெருகச் செய்தல் என்பனவும் மேற்கண்டவழி மாணவர்களை ஆளுமை மிக்கவர்களாக உருவாக்கி, போட்டித்தேர்வுகளுக்குத் தயார் செய்து அவர்களின் மொழித் திறனை மேம்படுத்த அவர்களுக்குக் கடிதம் எழுதும் கலையைக் கற்றுக்கொடுத்தல், அணி இலக்கணத்தை அறியச் செய்தல் என்பன இந்தப் பாடத்திட்டத்தின் முக்கிய நோக்கமாகும்.

அலகு 1 காப்பியங்கள் 8மணி நேரம்

சிலப்பதிகாரம்- கனாத்திறம் உரைத்தக் காதை முழுவதும்.

மணிமேகலை- மலர்வனம் புக்க காதை முழுவதும்.

கம்பராமாயணம் - குகப் படலம் (தேர்ந்தெடுக்கப்பட்ட ஒன்பது பாடல்கள்)

அலகு 1: பக்தி இலக்கியம் 8 மணி நேரம்

1. மாணிக்கவாசகர் - திருவாசகம் – மூன்று பாடல்கள்
   - ✓ புல்லாகி பூடாகி (சிவபுராணம்)
   - ✓ எல்லாப் பிறப்பும் (சிவபுராணம்)
   - ✓ உற்றாரை யான் வேண்டேன் (திருப்புலம்பல்)
2. ஆண்டாள் - திருப்பாவை – மூன்று பாடல்கள் (1, 3, 4)
   - ✓ மார்கழித் திங்கள் ... (பாசுரம் 1)
   - ✓ ஓங்கி உலகளந்த... (பாசுரம் 3)
   - ✓ ஆழிமழைக் கண்ணா... (பாசுரம் 4)
3. வீரமாமுனிவர் - தேம்பாவணி – வளன் சினைத்தப் படலம்
4. சீறாப்புராணம்- மானுக்கு பிணை நின்ற படலம்

அலகு 3 கலைகள் 07 மணி நேரம்

சிற்பம் - ஓவியம் - இசை - கூத்து - ஒப்பனை - ஆடை அணிகலன்கள்.

அலகு 4 நாகரிகம், பண்பாடு 7மணி நேரம்

சொற்பொருள் விளக்கம் - பண்டைத் தமிழர் வாழ்வியல் - அகம் - களவு - கற்பு - குடும்பம் - விருந்தோம்பல் - உறவு முறைகள் - சடங்குகள் - நம்பிக்கைகள் - பொழுதுபோக்கு - புறம் - போர் முறைகள் - நடுகல் வழிபாடு - கொடைப்பண்பு.

மொத்தம்: 30 மணி நேரம்

பார்வை நூல்கள்

8. தமிழர் நாகரிகமும் பண்பாடும், டாக்டர் அ. தட்சிணாமூர்த்தி, ஐந்திணைப் பதிப்பகம், 2001.
9. தவறின்றித் தமிழ் எழுதுவோம், மா. நன்னன், ஏகம் பதிப்பகம், 1999.
10. தவறின்றித் தமிழ் எழுத - மருதூர் அரங்கராசன், ஐந்திணைப் பதிப்பகம், 2003.
11. தமிழ் இலக்கிய வரலாறு, வரதராசன், மு., புது தில்லி : சாகித்திய அக்காதெமி, 2002.
12. புதிய தமிழ் இலக்கிய வரலாறு, நீல. பத்மநாபன், சிற்பி பாலசுப்ரமணியம், சாகித்திய அகாடெமி, 2007.
13. செம்மொழி தமிழின் சிறப்பியல்புகள் - முனைவர் மறைமலை இலக்குவனார்; https://www.youtube.com/watch?v=HHZnmJb4jSY
14. பாடநூல் தேடலுக்கான இணையம் - https://archive.org/

24LHIN21 **HINDI-II**

L	T	P	O	C
2	0	0	2	2

Course Objectives :

- To inculcate the human values, importance of patriotism and hard work
- To train students in functional Hindi
- To introduce the usage of Inscript keyboard

UNIT I : मुंशी प्रेमचंद कृत 'बूढी काकी' (कहानी)
'Boodee kaki" (Kahani) by Munshi Premchand 6hrs.

UNIT II : जयशंकर प्रसाद कृत 'पुरस्कार' (कहानी)
'Puraskar' (Kahani) by Jaishankar Prasad 6hrs.

UNIT III: हरिशंकर परसाई कृत 'मैं नरक से बोल रहा हूँ' (व्यंग्य)
'Main Narak Se Bhol Raha Hun' (Vyangy) by Harishankar Parsayi, 6hrs.

UNIT IV: व्यावहारिक हिन्दी 1 – 50 – तकनीकि शब्द, 50 – पदनाम व विभागीय नाम, भाव एक भाषा अनेक 6hrs.
Functional Hindi 1 - 50-Technical Words, 50-Designation & Department Names, Bhav Ek Bhasha Anek

UNIT V : व्यावहारिक हिन्दी 2 – पत्र लेखन – 3 औपचारिक पत्र, इन्स्क्रिप्ट कीबोर्ड का परिचय 6hrs.
Functional Hindi 2 -Letter Writing- 3 Official Letters.
Introduction to Inscript Keyboard

Total: 30hrs

Course Outcome:

At the end of this course Students will be able to

CO1 Know to the human values

CO2 Know the importance of patriotism

CO3 Know the value of hardwork in human life

CO4 Journalise in Functional Hindi

CO5 Use inscript keyboard

Text Book:

Ed. Subhash chandar, Boodi Kaki by Premchand, Natioonal Book Trust, 2012.

Jaishankar Prasad, Pratinidhi Kahaniyan, Raj Kamal Prakashan, 2015.

Harishankar Parsai, Pratinidhi vyangy, Rajkamal, 2007.

Kendriya Hindi Prashikshan Sansthan, Parangat, Bharat Sarkar, 2015.

Reference book:

Kendriya Hindi Sansthan, Banking Hindi Patyakram, 2012.

Weblink:

Munshi Premchand, Manasarovar, 2007, http://gadyakosh.org

Jaishankar Prasad/ http://gadyakosh.org

Harishankar Parsai/ https://hindikahani.hindi-kavita.com

Prayojanmoolak Hindi:https://hi.mwikipedia.org

https://rajbhasha.gov.in/en/introduction

24LFRE21 **FRENCH-II**

L	T	P	O	C
2	0	0	2	2

COURSE OBJECTIVES:

The lessons are being chosen:

- To express his / her where abouts and to ask seek direction
- To express obligation and restriction
- To describe a place
- To narrate and to question
- To describe someone
- To express his desire and to speak about the futur

UNIT I C'est où **5 HOURS**

- L'impératif, Les articles contractés au, à la…, Le passé composé et l'accord du participe passé avec être.

UNIT II N'oubliez pas **5 HOURS**

- Le pronom relatif Qui, que, où, Les pronoms compléments indirects (me, te, lui, leur…)

UNIT III Belle vue sur la mer -- **4 HOURS**

- Les adjectifs démonstratifs, Y- pronom complement

UNIT IV Quel beau voyage! **4 HOURS**

- Les verbes pronominaux, En- pronom complément

UNIT V Oh ! joli **5 HOURS**

- L'imparfait, L'imparfait ou le passé composé

UNIT VI Et après ? **7 HOURS**

- Le futur simple, Le subjonctif présent

TOTAL 30 HOURS

COURSE OUTCOMES:

1) The students would be able to express his/her where about and to ask direction
2) The students would be able to express obligation and restriction
3) The students would be able to describe a place
4) The students would be able to narrate and to question
5) The students would be able to describe someone
6) The students would be able to express his desire and to speak about the futur

REFERENCES:

1. LATITUDES 1 (A1/A2) MÉTHODE DE FRANÇAIS - Régine Mérieux and Yves Loiseau
2. SAISON A1 - MÉTHODE DE FRANÇAIS - Marie-Noëlle Cocton, Élodie Heu, Catherine Houssa, Émilie Kasazian

24LENG21 **ENGLISH-II**

L	T	P	O	C
2	0	0	2	2

COURSE OBJECTIVES:

- To read and understand different types of prose, poetry, and fiction.
- To think critically about texts and express ideas clearly.
- To recognize and discuss key themes and styles in literary works.
- To learn and use grammar rules correctly in writing and speaking.
- To write more effectively by applying grammar and literary techniques

UNIT I PROSE **6 HOURS**

- If you are wrong, admit it- Dale Garnegie
- Words of Wisdom- Chetan Bhaghat

UNIT II POETRY **6 HOURS**

- La Belle Dame Sans Merci - John Keats
- Ozymandias- P.B.Shelley

UNIT III FICTION **6 HOURS**

- The School for Empathy - E.V. Lucas
- The Lamb to the Slaughter-Roald Dahl

UNIT IV GRAMMAR **6 HOURS**

- Types of sentences, Concord

UNIT V GRAMMAR **6 HOURS**

- Tenses, Voices

TOTAL 30 HOURS

COURSE OUTCOMES:

Upon completion of this course, the students will be able to

CO1 Identify poetic expressions in the course of daily speech

CO2 Students will develop skills that enable them to communicate effectively in writing.

CO3 Students will develop skills that enable them to communicate effectively in writing.

CO4 Discriminate against different sensibilities in approaching life.

CO5 Strengthen the ability to solve life's problems, as highlighted in the selections.

REFERENCES:

1. Dr. M. Narayana Rao and Dr. B. G. Barki–Anu's Current English for Communication (AnuChitra). June 2012.
2. General English for competitive examinations by V.Rajagopalan (Mcgraw Hill Education) -2010

24CBAR21 **AVIATION METEOROLOGY**

L	T	P	O	C
3	0	0	2	3

COURSE OBJECTIVES:

To provide an understanding of the physical properties of the atmosphere and how they affect the weather, with an emphasis on the factors affecting aviation and Observation and reporting of weather for Aviation services.

UNIT I **THE ATMOSPHERE** **9 HOURS**

The Atmosphere, Atmospheric Pressure, Temperature, Air Density, Humidity, Winds.

UNIT II **VISIBILITY AND PRECIPITATION PHENOMENA** **9 HOURS**

Visibility and Fog, Vertical Motion and Clouds, Stability and Instability of Atmosphere, Optical Phenomena, Precipitation, Ice Accretion, Thunderstorm

UNIT III **AIR MASSES, FRONTS AND WESTERN DISTURBANCES** **9 HOURS**

Air Masses, Fronts and Western Disturbances, Jet Streams, CAT, Mountain Waves

UNIT IV **CLIMATOLOGY AND CIRCULATION** **9 HOURS**

Tropical Systems, Climatology of India, General Circulation

UNIT V **AVIATION WEATHER FORECAST & BRIEFING** **9 HOURS**

Meteorological Services, Weather Radar and Met Satellites, Met Instruments, Station Model, Reports: METAR & SPECI, TREND, TAF, ARFOR, Symbols, ROFOR, RAREP, SIGMET, Met Documentation and Briefing, Flight and Cross Section Forecast of Route Conditions

TOTAL: 45 HOURS

COURSE OUTCOMES:

Upon completion of this course, the students will be able to

CO1: Examine the effect of weather elements on aircraft operation..

CO2: Predict the weather hazards and explain its effect on aircraft operation.

CO3: Classify different climate types.

CO4: Decode the METAR/ SPECI code for different weather conditions

CO5: Produce TREND forecasts in a centralized forecasting environment

TEXT BOOKS:

1. IC Joshi, “Ground Subjects CPL/ATPL Aviation Meteorology”, Himalayan Books; Sixth Edition (1 January 2019).
2. Oxford ATPL, Jepessen ATPL, Ic Josh Indian Climatology.

REFERENCES:

1. Om Prakash Agarwal, “Aviation meteorology for pilots”, Blue Rose Publishers; 1st edition (5 January 2018).
2. Navale Pandharinath, “Aviation Meteorology”, Bsp Books Pvt. Ltd. (1 August 2014).
3. Dennis W. Newton, Scott Crossfield, “Severe Weather Flying”, Aviation Supplies & Academics Inc; 3rd edition (1 March 2003).
4. R.B. Underdown and John Standen, “Ground Studies for Pilots Meteorology”, Wiley India Pvt Ltd; 3rd edition (5 March 2008).

WEB LINKS:

1. https://www.iata.org/en/training/courses/airline-industry-introduction/talg50hlm/en/.

24CBAR22 **FAMILIARIZATION OF ATC AND AIRSPACE**

L	T	P	O	C
3	0	0	2	3

COURSE OBJECTIVES:

To provide the participants with a good knowledge on Air Traffic services, its units and types of services and understanding the regulatory aspects pertaining to ATC.

UNIT I INTRODUCTION TO ATC 9 Hours

Overview of ATC systems and services, Roles and responsibilities of ATC Controllers, ATC communication procedure and phraseology, introduction to radar and surveillance systems.

UNIT II AIRSPACE CLASSIFICATION AND STRUCTURE 9 Hours

Classification of airspace (Class A to class G) and their characteristics, understanding special use airspace (SUA) such as restricted areas, military operations areas, Airspace design and its relationship to Air traffic management.

UNIT III AIR TRAFFIC CONTROL PROCEDURES 9 Hours

Separation standard and rules (vertical, lateral, longitudinal), clearances and instruction given by ATC, traffic flow management and sequences techniques.

UNIT IV NAVIGATION SYSTEMS AND WEATHER IMPACTS 9 Hours

Principles of navigation aids (VOR, NDB, GPS, GNSS) -Instrument flight rules procedures and approaches- Weather phenomena affecting air traffic operations, Meteorological information services provided to pilot and ATC, Decision making based on weather conditions.

UNIT V GROUND CONTROL AND AIR TRAFFIC MANAGEMENT SYSTEMS 9 Hours

Ground movement control and apron management-airport layout and taxiway procedures, -Aircraft handling services and ground support equipment, future concepts and technology in air traffic management, Compliance and enforcement procedure.

TOTAL: 45 HOURS

COURSE OUTCOMES:

After the course the students are expected to be able to

CO-1: Gain knowledge about ATC phraseology & communication

CO-2: Gain knowledge in understanding of introduction to Air Traffic services.

CO-3: Gain knowledge on airspace classification

CO-4: Gain knowledge on insights of FIS & Alerting service

CO-5: Gain knowledge on regulatory aspects of ATC and case study.

TEXT BOOKS:

1. Manual of Air Traffic Services, Part-1 Edition 6.2
2. Aeronautical Information Publication - AIP
3. ATFM Operations Handbook
4. Michael S Nolan, "Fundamentals of Air Traffic Control", Thomson Delmar Learning, Division of Thomson Learning; 5th Revised ed. edition (28 January 2010).

REFERENCE BOOKS

1. CIVIL AVIATION REQUIREMENTS, section 9 – air space and air navigation standards
2. ICAO Annex 11, 15th Edition, 2018.
3. ICAO Doc 8126, Seventh Edition, 2021

WEB LINKS:

1. https://slideplayer.com/amp/1705721/
2. https://www.icao.int/safety/Pages/atm.aspx
3. https://aai.aero

24MBAR21 PRINCIPLES OF MANAGEMENT

L	T	P	O	C
3	0	0	2	3

COURSE OBJECTIVES:

To enable the students to study the evolution of Management, to study the functions and principles of management and to learn the application of the principles in an organization

UNIT I INTRODUCTION TO MANAGEMENT AND ORGANIZATIONS 9 HOURS

Definition of Management – Science or Art – Manager Vs Entrepreneur - types of managers - managerial roles and skills – Evolution of Management – Scientific, human relations , system and contingency approaches – Types of Business organization - Sole proprietorship, partnership, company-public and private sector enterprises - Organization culture and Environment – Current trends and issues in Management.

UNIT II PLANNING 9 HOURS

Nature and purpose of planning – planning process – types of planning – objectives – setting objectives – policies – Planning premises – Strategic Management – Planning Tools and Techniques – Decision making steps and process.

UNIT III ORGANISING 9 HOURS

Nature and purpose – Formal and informal organization – organization chart – organization structure – types – Line and staff authority – departmentalization – delegation of authority – centralization and decentralization – Job Design - Human Resource Management – HR Planning, Recruitment, selection, Training and Development, Performance Management , Career planning and management.

UNIT IV DIRECTING 9 HOURS

Foundations of individual and group behaviour – motivation – motivation theories – motivational techniques – job satisfaction – job enrichment – leadership – types and theories of leadership – communication – process of communication – barrier in communication – effective communication – communication and IT.

UNIT V CONTROLLING 9 HOURS

System and process of controlling – budgetary and non-budgetary control techniques – use of computers and IT in Management control – Productivity problems and management – control and performance – direct and preventive control – reporting

TOTAL-45 HOURS

COURSE OUTCOMES:

Upon completion of this course, the students will be able to

CO1: Understanding basic knowledge on international aspect of management.

CO2: Understanding of managerial functions like planning.

CO3: Understanding of managerial functions like organizing.

CO4: Understanding of managerial functions like staffing

CO5: Understanding of managerial functions like leading & controlling

TEXT BOOKS:

1. Stephen P. Robbins & Mary Coulter, "Management", 10th Edition, Prentice Hall (India) Pvt. Ltd., 2009.
2. JAF Stoner, Freeman R.E and Daniel R Gilbert "Management", 6th Edition, Pearson Education, 2004

REFERENCES:

1. Stephen A. Robbins & David A. Decenzo & Mary Coulter, "Fundamentals of Management" 7th Edition, Pearson Education, 2011.
2. Robert Kreitner & Mamata Mohapatra, "Management", Biztantra, 2008.
3. Harold Koontz & Heinz Weihrich "Essentials of management" Tata Mc Graw Hill, 1998.
4. Tripathy PC & Reddy PN, "Principles of Management", Tata McGraw Hill, 1999.

24PBAR21 **WORKSHOP PRACTICES LAB**

L	T	P	O	C
0	0	2	1	1

COURSE OBJECTIVES:

- To provide exposure to the students with hands on experience on various basic engineeringpractices.
- To Study and practice the various operations that can be performed in lathe, shaper, drilling, milling machines etc. and to equip with the practical knowledge required in the core industries.
- To Study and acquire knowledge on various basic machining operations in special purpose machines and its applications in real time manufacturing of components in the industries.

Exp. no.	EXPERIMENTS	Number of Hours
1	Sheet metal marking, cutting, sheet metal structural defects	2
2	Practice of 1st model. Butt Joint and inspect	2
3	Practice of 2nd model. Lap Joint and inspect	2
4	Practice of 3rd model. V-Joint and inspect	2
5	Practice of 3rd model. T-Joint and inspect	2
6	Demonstration of 1st model Dovetail	3
7	Demonstration of 2nd model- Radius Gauge	3
8	Inspection of various welded samples with / without defects and record Observation	3
9	Soldering Exercises, inspection and defects	3
10	Cable splicing and swaging	3
11	Pipe bending and inspection of pipe assembly	3
12	Taps and dies, thread cutting and inspection	2

TOTAL: 30 HOURS

COURSE OUTCOMES

Upon the completion of this course the students will be able to

1. Use sheet metal fabrication tools and make simple models as per the given diagram.
2. Fabricate carpentry components and pipe connections including plumbing works.
3. Use welding equipment to join the structures.

24PBAR22 **AERODYNAMICS LAB**

L	T	P	O	C
0	0	2	1	1

COURSE OBJECTIVES:

To perform aerodynamic tasks to help students understand the basic principles of aerodynamics and improve their experimental skills.

Exp no	EXPERIMENTS	Number of Hours
01	Flow visualization – Hele Shaw apparatus	3
02	Flow around various objects in a 'Water Channel' - Square, Cylinder, Aerofoil, Understanding laminar flow, turbulent flow, stagnation point, flow separation, boundary layer	3
03	Water Channel – Study of boundary layer	3
04	Study of flow over streamlined bodies with different angle of attack by flow visualization technique	3
05	Identification of flight control surfaces and their effect on flight control - Aircraft Model	3
06	Identifying High lift devices and practical understanding of their effect on lift with respect to aircraft speed (Air flow)	3
07	Practical understanding of lift spoiling devices	3
08	Practical study of various factors affecting lift and drag on an aerofoil	3
09	Factors affecting flow of fluid over an aerofoil surface and demonstrate the Venturi effect	3
10	Identify various type of flap surfaces and their effect on high lift and high drag characteristic	3

TOTAL: 30 HOURS

COURSE OUTCOMES:

On completion of the course students will be able to

CO1: Explain the nature of aerodynamic forces.

CO2: Define the aerodynamic center and the center of pressure for an airfoil.

CO3: Calculate aerodynamic forces and moments on bodies.

CO4: Use flow similarity to design wind tunnel tests.

CO5: Describe and perform flow visualization tests to study the characteristics of the flow around aerodynamic bodies.

REFERENCES:

1. John Anderson Jr. Fundamentals of Aerodynamics McGraw Hill Education; 5th edition(6 July 2010).
2. R. K. Goyal & Kamal Kishore Khatri Fundamentals of Aerodynamics NeelkanthPublishers (1 January 2012).
3. https://www.youtube.com/watch?v=ewMJuzqK58s&ab_channel=AnsysLearning
4. https://www.youtube.com/watch?v=edLnZgF9mUg&ab_channel=MITOpenCourseWare
5. https://www.youtube.com/watch?v=eCH8UNG_4qc&ab_channel=NPTELIITGuwahati
6. https://www.youtube.com/watch?v=eCH8UNG_4qc&list=RDCMUCCDzHkpuIuD1ZC0wsCXUuPQ&start_radio=1&rv=eCH8UNG_4qc&t=14&ab_channel=NPTELIITGuwahati

24DVAC22 **UNIVERSAL HUMAN VALUES**

L	T	P	O	C
1	0	0	1	1

COURSE OBJECTIVES:

The candidates will be able to appreciate the complementarity between the values and skills for sustained happiness and prosperity. To influence the students to approach the life and profession with a holistic perspective towards a value-based living in a natural way. To highlight plausible implications of holistic understanding of ethical human conduct.

UNIT I INTRODUCTION TO VALUE EDUCATION 5 HOURS

Living a fulfilling life. Value education. Skill education. Complementarity of Values and Skills. Development of a holistic perspective. Right understanding, relationship and physical facility. Understanding the happiness and prosperity.

UNIT II HARMONY AT MULTIPLE LEVELS 5 HOURS

Human being as co-existence of the self and the human body. Understanding harmony in the self. Harmony in the family and understanding values in human-human relationships. Harmony in the society and understanding universal human order. Harmony in nature and understanding the interconnectedness, self-regulation and mutual fulfillment. Harmony in existence and understanding co-existence at various levels.

UNIT III IMPLICATIONS OF THE RIGHT UNDERSTANDING 5 HOURS

Ethical human conduct. Implications of value-based living. Right understanding of professional ethics. Humanistic education. Holistic technologies, production systems and management models. Strategies for transition towards value-based life and profession.

TOTAL: 15 HOURS

COURSE OUTCOMES:

At the end of the course learners will be able to:

CO1: Develop qualities like responsibility and the ability to handle problems with sustainable solutions.

CO2: Appraise human values and the harmony at various levels.

CO3: Perceive a better critical ability.

CO4: Develop qualities pertaining to value-based living.

CO5: Apply what they have learnt to their own self in real life settings.

TEXT BOOKS:

1. R.R. Gaur, R. Asthana, G.P. Bagaria. (2023). A Foundation Course in Human Values and Professional Ethics. 3rd Revised Edition. Excel Books, New Delhi.

REFERENCES:

1. A. Nagaraj, Jeevan Vidya Prakashan, Amar Kantak. Jeevan Vidya: Ek Parichaya . (1999).
2. Rakesh Gupta. (2008). Jeevan Vidya: An Introduction (Introductory Book to Madhyasth Darshan-Coexistentialism). English Version.
3. A. N. Tripathi. (2004). Human Values. First Edition. New Age International Publishers, New Delhi.

24SSKU21 **SOFT SKILLS -II**

L	T	P	O	C
2	0	0	1	2

COURSE OBJECTIVES:

- To develop strategies to enhance teamwork and collaboration in professional settings.
- To cultivate a positive attitude and mindset to foster constructive relationships and productivity.
- To develop leadership, decision-making and team bonding skills

UNIT I PROFESSIONAL BEHAVIOUR 6 HOURS

- Team Building – Team Bonding
- Inter-Personal Relationship– Intra-Personal Relationship

UNIT II PERSONALITY DEVELOPMENT. 6 HOURS

- Types of Personality
- Self-Confidence - Confidence Building
- Attitude (Positive/Negative)

UNIT III TELEPHONE ETIQUETTE 6 HOURS

- Basics of telephone etiquette
- Giving clear and concise information
- Tone & rate of speech
- Intonations & its Importance
- Whatsapp Communications

UNIT IV DECISION MAKING 6 HOURS

- Types of Decisions – planned-unplanned, individual-group, major-minor
- Types of Leadership styles – Autocratic, democratic, lesse-faire, participative, bureaucratic.

UNIT V PROFESSIONAL ETIQUETTE 6 HOURS

- Respect – Salutations
- Official Behaviour

TOTAL 30 HOURS

COURSE OUTCOMES:

Upon completion of this course, the students will be able to

CO1 Understand the principles of effective team building and apply strategies to foster team bonding and cohesion in professional settings

CO2 Become self-confident individuals by mastering interpersonal skills, team management skills, and leadership skills.

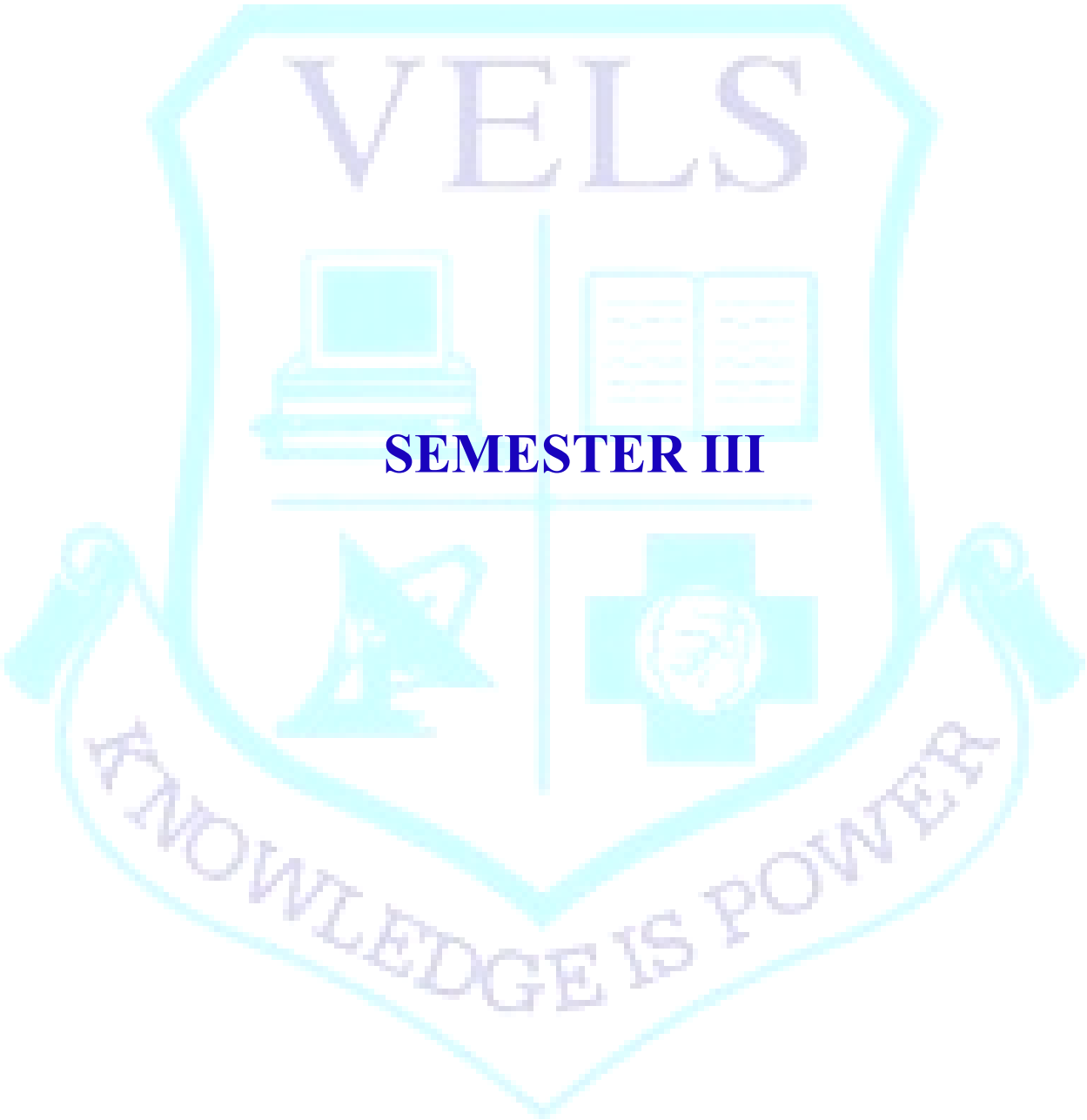
CO3 Practice techniques for effective communication in telephone conversations.

CO4 Evaluate decision-making processes and their implications in professional settings

CO5 Exhibit professional conduct and demeanour in various professional situations

REFERENCES:

1. Language Service, University at Oberta de Catalunya
2. Taylor. Grant English Conversation Practice. Tata McGraw Hill Education Pvt. Ltd 2005
3. Tiko, Champa& Jaya Sasikumar. Writing with a purpose. OUP New Delhi 1979
4. Alex, Dr. K. (2014). Soft Skills (1st edition) S Chand & Company.
5. Nelson-Jones, R. (1992). Life skills, a handbook, Trowbridge, Wilts: Detesios Ltd.



SEMESTER III

24LTAM31 **TAMIL-III**

L	T	P	O	C
2	0	0	2	2

சிற்றிலக்கியம். சிறுகதை, எழுதுதிறன், பேச்சுக்கலை.

பாடத்திட்ட நோக்கம்:

மாணவர்களின் இலக்கிய நாட்டத்தை மேம்படுத்துதல், பக்தி இலக்கியத்தை மாணவர்களுக்கு அறிமுகப்படுத்தி, அதன்வழி தமிழர்தம் பக்தி உணர்வையும் அதன் மேன்மையையும், கலைத்திறனையும் வெளிப்படுத்துதல், காப்பியம், புதினம் என்ற இலக்கிய வகைமைகளை அறிமுகப்படுத்துதல், மாணவர்களின் மொழித்திறனை மேம்படுத்தும் வகையில் மொழிபெயர்ப்பு, இலக்கணக் குறிப்பு என்பனவற்றை அறியச் செய்தல், மேற்கண்டவழி மாணவர்களைப் போட்டித்தேர்வுகளுக்குத் தயார் செய்தல் இந்தப் பாடத்திட்டத்தின் முக்கிய நோக்கமாகும்.

அலகு 1: சிற்றிலக்கியம் 8 மணி நேரம்

1. நந்திக்கலம்பகம் - உரைவரம் பிகந்த உயர்புகழ்ப்
   வானுறுமதியை அடைந்தது உன்வதனம்
2. தமிழ்விடு தூது – 10 கண்ணிகள்
3. திருக்குற்றாலக் குறவஞ்சி – மலைவளம் கூறுதல் – முதல் 5 பாடல்கள்
4. கலிங்கத்துப் பரணி – பாலை பாடியது – முதல் 5 பாடல்கள்

அலகு 2: சிறுகதை 8 மணிநேரம்

1. அறிஞர் அண்ணா - செவ்வாழை
2. புதுமைப்பித்தன் - கடவுளும் கந்தசாமிப் பிள்ளையும்
3. கி.ராஜநாராயணன் - கதவு

அலகு 3 எழுதுதிறன் 7மணி நேரம்

கலைச்சொல்லாக்கம் - தேவைகள் - கலைச்சொற்களின் பண்புகள் - கலைச்சொல்லாக்கத்தில் தவிர்க்க வேண்டியவை - அறிவியல் கலைச்சொற்கள்.

கடிதம் - வகைகள் - அலுவலகக் கடிதங்கள் - பயிற்சி - அறிஞர்களின் கடிதங்கள் - கடிதங்களின் வழி கற்பித்தல் - சில அறிஞர்களின் கடிதங்கள் - நேரு...,

அலகு 4: **பேச்சுக் கலை** 8 மணி நேரம்

பேச்சுத் திறன் – விளக்கம் – பேச்சுத்திறனின் அடிப்படைகள் – வகைகள் – மேடைப்பேச்சு – உடையாடல் - பயிற்சிகள்

மொத்தம்: 30 மணி நேரம்

பார்வை நூல்கள்

1. **தமிழர் நாகரிகமும் பண்பாடும்,** டாக்டர் அ. தட்சிணாமூர்த்தி, ஐந்திணைப் பதிப்பகம், 2001.
2. **தவறின்றித் தமிழ் எழுதுவோம்**, மா. நன்னன், ஏகம் பதிப்பகம், 1999.
3. **தவறின்றித் தமிழ் எழுத** - மருதூர் அரங்கராசன், ஐந்திணைப் பதிப்பகம், 2003.
4. **தமிழ் இலக்கிய வரலாறு**, வரதராசன், மு., புது தில்லி : சாகித்திய அக்காதெமி, 2002.
5. **புதிய தமிழ் இலக்கிய வரலாறு**, நீல. பத்மநாபன், சிற்பி பாலசுப்ரமணியம், சாகித்திய அகாடெமி, 2007.
6. **செம்மொழி தமிழின் சிறப்பியல்புகள்** - முனைவர் மறைமலை இலக்குவனார்; https://www.youtube.com/watch?v=HHZnmJb4jSY
7. **பாடநூல் தேடலுக்கான இணையம் -** https://archive.org/

24LFRE31 **FRENCH-III**

L	T	P	O	C
2	0	0	2	2

COURSE OBJECTIVES:

The lessons are being chosen:

1) To express certainty and uncertainty
2) To express one's desire to do something
3) To express one's willingness and unwillingness to do something
4) To express one's joy and sorrow
5) To express one's fear, concern and astonishment
6) To express one's anger and regrets

UNIT I Très drôle **6 HOURS**

- le passe recent, passe compose et l'imparfait

UNIT II Vous avez dit culture **5 HOURS**

- l'interrogation et le subjonctif

UNIT III Envie d'ailleurs **4 HOURS**

- les verbes aller/ retourner, venir/ revenir, ne...pas...ni, ne…ni…ni.

UNIT IV Voila l'été **4 HOURS**

- le comparatif, superlatif et l'accord du participe passe avec avoir.

UNIT V Terre inconnue **5 HOURS**

- le plus-que parfait

UNIT VI Vivement dimanche **6 HOURS**

- le pronom en et y, le subjonctif et les conjugaisons irrégulières.

TOTAL 30 HOURS

COURSE OUTCOMES:

1) The students would be able to express certainty and uncertainty
2) The students would be able to express one's desire to do something
3) The students would be able to express one's willingness and unwillingness to do something
4) The students would be able to express one's joy and sorrow
5) The students would be able to express one's fear, concern and astonishment
6) The students would be able to express one's anger and regrets

REFERENCES:

1. LATITUDES 1 (A1/A2) MÉTHODE DE FRANÇAIS - Régine Mérieux and Yves Loiseau
2. SAISON A1 - MÉTHODE DE FRANÇAIS - Marie-Noëlle Cocton, Élodie Heu, Catherine Houssa, Émilie Kasazian

24LHIN31 **HINDI-III**

L	T	P	O	C
2	0	0	1	2

Course Objectives :

- To enrich the knowledge of students about through Thirukkural
- To enable them to learn life values through ancient and medievial poems of Hindi Literature
- To develop translation and advertisements skills in Hindi

UNIT I: ततरुवल्लुवि कृ त ततरुक्कु िल – 5, अमीि खसिो कृ त पहेतलयाँ - 5
'Thirukkural'- 5 Kural-by Thiruvalluvar & 6hrs.
Amir Khusro-5 Paheliyan

UNIT II: कबीि के दोहे – 5
Kabir Ke Dohe -5 6hrs.

UNIT III: तुलसीदास के पद – 2 & सूिदास के पद – 2
Tulsidas Ke Pad-2 & SurdasKe Pad-2 6hrs.

UNIT IV: व्यावहारिक हहन्दी 1 – अनुवाद का परिचय (अि परिभाि व प्रकाि) & 5 - अभ्यास अनुच्छेद
Functional Hindi 1 - Introduction to Translation 6hrs.
(Meaning, Definition &Types) & Exercise passages – 5

UNIT V: व्यावहारिक हहन्दी 2 - ववज्ञापन का परिचय (अि. परिभाि व प्रकाि) & 4 – नमूना ववज्ञापन 6hrs.
Advertisement –Introduction (Meaning, Definition &
Types) & Model Advertisement - 4

Total:30hrs

Course Outcome:
At the end of this course Students will
CO1 Know the valuable messages in social responsibilities
CO2 & CO3 Know the life values
CO4 Gain knowledge of translation in functional Hindi
CO5 Gain knowledge about advertisement skills in Hindi

Text Book:
Thirukkural, Bharatiya Gyanpeet, 2014.
Amir Khusro Ki Paheliyan, Prakrit Bharati Acadamy, 2006.
Amar Prakash, Kahir Dohavali, Mahamaya Publication, 2020.
Tulsidas, Dohavali, Geeta Press, Gorakhpur.
Vagdev, Surdas Ke Padavali, Prabhat Prakashan, 2011.

Reference book:
Rachana Vyas, Amir Khusro Ki Paheliyan, Lokoday Prakashan Pvt. Ltd., 2022.
Kendriya Hindi Sansthan, Banking Hindi Patyakram, 2012.
Kendriya Hindi Prashikshan Sansthan, Parangat, Bharat Sarkar, 2015.

Weblinks:
Thirukkural hindi translation by Venkata Krishnan
Ameer khusro ki paheliyan - https://www.hktbharat.com
Kabir ke Dohe - Kabir granthavali_ Surhranthavali-http://kavitakosh.org
Tulsidas ke pad - http://kavitakosh.org

24LENG31

ENGLISH-III ENGLISH FOR COMPETITIVE EXAMINATIONS

L	T	P	O	C
2	0	0	2	2

COURSE OBJECTIVES:

- To enhance reading comprehension skills for understanding complex texts in competitive exams.
- To develop vocabulary and language proficiency to tackle verbal reasoning sections effectively.
- To improve grammar and writing skills for precise and coherent expression in written exams.
- To practice critical thinking and analytical reasoning abilities required for exam questions.

UNIT I VERBAL ABILITY **6 HOURS**

- Homophones, Homonyms, Jumbled sentences, Spot the Errors

UNIT II COMPREHENSION **6 HOURS**

- Reading comprehension, Critical reading, Cloze test

UNIT III GRAMMAR **6 HOURS**

- Idioms and Phrases, Question tag, Phrasal Verbs, Prepositions, Articles

UNIT IV GRAMMAR **6 HOURS**

- Voices, Direct & Indirect speech, Simple, Compound, Complex Sentences.

UNIT V ACADEMIC WRITING **6 HOURS**

- Precis writing, Report writing, Email Writing

TOTAL 30 HOURS

COURSE OUTCOMES:

At the end of this course, the students would have learnt to

CO1: Students imbibe the rules of language unconsciously and tune in to deduce language structure and usage.

CO2: Students develop their abilities as critical readers and writers.

CO3 Students decipher the mechanism of language and use it for success in competitive examinations and job-related speaking and writing tasks.

CO4: construct grammatically flawless sentences in oral and written communication.

CO5: express their thoughts and views in a concise manner in writing.

REFERENCES:

1. General English for competitive examinations by V. Rajagopalan (McGraw Hill Education) -2010.
2. Technical Communication – Principles and Practices By Meenakshi Raman & Sangeetaa K. Sharma, Oxford Univ. Press, 2016, New Delhi.
3. Ibbotson, Mark. Professional English in Use: Engineering: Technical English for Professionals. Cambridge University Press, 2009.
4. Wallwork, Adrian. User guides, manuals, and technical writing: A guide to professional English. Springer, 2014

24CBAR31 **RADIO TELEPHONY**
RESTRICTED

L	T	P	O	C
3	0	0	2	3

COURSE OBJECTIVES:

To understand various aviation terminologies, Standard Universal Communication Procedures followed by different departments of Aviation.

UNIT I **REGULATIONS** **9 HOURS**

Duties of ITU, ICAO, AAI, WPC, ICAO Annexure, Spelling of Alphabets and Transmission of numerical, Aircraft Identification, Location Indicators, Flight Information Regions, Identification of Ground Services.

UNIT II **RADIOPROPAGATION** **9 HOURS**

(a) Relationship between wavelength, frequency and speed flight
(b) Frequency bands and ranges
(c) Ionosphere layers during day and night
(d) Mode of Propagation MF, HF and VHF& above
(e) Operation of Geostationary Satellites
(f) Operation of Polar orbiting Satellites
(g) Diving
(h) Skip Distance

Choice of Frequencies during Day & Night

UNIT III **PHRASEOLOGY** **9 HOURS**

Phraseology used in Aeronautical Communication Services Abbreviation used in aeronautical communication services.

(a) Emergency
(b) Emergency Relay
(c) Urgency
(d) Urgency relay
(e) Blind transmission
(f) Weather deviation.

UNIT IV **'Q'CODES** **9 HOURS**

'Q' Codes used in Aeronautical Communication Services, QNH, QFE, Height, Elevation, Altitude, Flight Level, ISA Conditions, Lapse Rate, ISA Deviation problems.

UNIT V **COMMUNICATION** **9 HOURS**

Terminal Communication & En-route Communication, METAR, NOTAM and SNOWTAM, Need of Primary and Secondary Frequencies

TOTAL-45 HOURS

COURSE OUTCOMES:

After the course the students are expected to be able to

CO1: Explain the basic regulations of Radio communications.

CO2: Describe the principles of Radio waves and its Propagation

CO3: Illustrate the Phraseologies used in Aviation sector.

CO4: Understanding of Q codes and ISA.

CO5: Decode the aviation code communication

TEXT BOOKS:

1. K.D.Tuli, "Guide To Flight Radio telephony Radio Aids &Avionics Vol I& II", Himalayan Books, 11THEdition, 2018.
2. R.B.Underdown and David Cockburn, "Ground Studies for Pilots: Radio Aids", Wiley India Pvt Ltd; Sixth edition (7 July 2019).
3. Trevor Thom, "Radio Navigation and Instrument Flying: AirPilot's Manual", Airlife Pub Ltd (1July 2020).

REFERENCES:

1. 1 Keith Williams, "RadioNavigation 1000questions and answers with explanation", The English Book Store (The Aviation People) (1 January 2019).
2. Alan E. Bramson, Neville Birchand Alan Branson, "Radio Navigation for Pilots", Gardners Books; 3rd edition (June30, 2020).

WEBLINKS:

1. https://www.skybrary.aero/bookshelf/books/249.pdf
2. https://www.udemy.com/course/manual-of-radio-telephony-part-1/

24CBAR32 **GENERAL NAVIGATION**

L	T	P	O	C
3	0	0	2	3

COURSE OBJECTIVES:

The objective of the course is to develop student understanding and skills in fundamental concepts of communication and general navigation.

UNIT I **EARTH, DIRECTION, POSITION, UNITS OF DISTANCE** **9 HOURS**

Direction: The form of the Earth, Basic Direction; Lines on the Surface of the Earth: Great Circle, Small circle, Rhumb Line. Position: Latitude, Longitude, Calculation on change of latitude and longitude, Units of distance: NM, KM, SM conversions.

UNIT II **DEPATURE, EARTH, MAGNETISM, 1 IN 60 RULE** **9 HOURS**

Introduction to Departures, Calculations on departures, Earth Magnetism: Variation, Magnetic Dip and Deviation. 1 in 60 Rule: Rule and geometry, Application in Basic Navigation

UNIT III **CRITICAL POINT, POINT OF NO RETURN, SCALE** **9 HOURS**

Introduction of Critical point, Applications and calculation of Critical point, Introduction of PNR, Applications and calculation of Point of No Return, Scale: Scale and Calculation

UNIT IV **CHART AND PROJECTIONS** **9 HOURS**

Chart Overview: Types of projections, Orthomorphism/Conformality; Normal Mercator: Mercator – Intro and Overview of Projections, Mercator – Principle of Construction, Mercator Properties. Lambert's Conformal: Lambert's Projection and properties, Polar Stereographic: Polar Projection and properties. Transverse and Oblique Mercator: Transverse Mercator Oblique Mercator;

UNIT V **TIME, AIRCRAFT MAGNETISM** **9 HOURS**

Time: Solar system and Kepler's law, Seasonal Variation, Twilight period, Sunrise and Sunset, Declination and Hour Angle, UTC/GMT, LMT, ST, ZT. Aircraft magnetism – Hard iron and vertical soft iron – the resulting magnetic fields – the variation in directive force – Compass Swing, Compass correction – magnetic deviation, variation, Headings- Compass and True.

TOTAL: 45 HOURS

COURSE OUTCOMES:

After the course the students are expected to be able to

CO1: Describe the geometric properties of The Earth.

CO2: Examine the method to measure the Distance and Earth Magnetism.

CO3: Use the topographical maps to navigate.

CO4: Use normal, transverse and oblique Mercator to navigate and Time

CO5: Illustrate the concepts of Aircraft Magnetism and instruments in an aircraft.

TEXT BOOKS:

1. R K Bali, "AIR NAVIGATION". 8th edition (2020).
2. K.S. Ramakrishnan, "Air Navigation", Integrity Media; First edition (1 January2019).
3. CAE Oxford Aviation Academy – General Navigation. 8th edition, 2021.

REFERENCES:

1. Trevor Thom, "Air Navigation", Airlife Pub Ltd (1 July 2020).
2. Keith Williams, "1000 Questions Answers & Explanations for JAR ATPL (A) & CPL (A) - General Navigation", The English Book Store (The Aviation People); 2016th edition (1 January 2020).

WEB LINKS:

1. https://answeringatpl.com/general_navigation/
2. https://youtu.be/gchRWHVyWZc
3. http://homepage.eircom.net/~eireanseo/nav.pdf
4. https://www.pilot18.com/atpl-air-navigation-materials/

24MBAR31 **NON-DESTRUCTIVE TESTING**

L	T	P	O	C
3	0	0	2	3

COURSE OBJECTIVES:

To study and understand the various Non-Destructive Evaluation and Testing methods, theory and their industrial applications

UNIT I **OVERVIEW OF NDT** **9 HOURS**

NDT Versus Mechanical testing, Overview of the Non-Destructive Testing Methods for the detection of manufacturing defects as well as material characterization. Relative merits and limitations, Various physical characteristics of materials and their applications in NDT., Visual inspection Unaided and aided.

UNIT II **SURFACE NDE METHODS** **9 HOURS**

Liquid Penetrant Testing - Principles, types and properties of liquid penetrants, developers, advantages and limitations of various methods, Testing Procedure, Interpretation of results. Magnetic Particle Testing- Theory of magnetism, inspection materials Magnetisation methods, Interpretation and evaluation of test indications, Principles and methods of demagnetization, Residual magnetism.

UNIT III **THERMOGRAPHY AND EDDY CURRENT TESTING (ET)** **9 HOURS**

Thermography- Principles, Contact and non-contact inspection methods, Techniques for applying liquid crystals, Advantages and limitation - infrared radiation and infrared detectors, Instrumentations and methods, applications. Eddy Current Testing-Generation of eddy currents, Properties of eddy currents, Eddy current sensing elements, Probes, Instrumentation, Types of arrangement, Applications, advantages, Limitations, Interpretation/Evaluation.

UNIT IV **ULTRASONIC TESTING (UT) AND ACOUSTIC EMISSION (AE)** **9 HOURS**

Ultrasonic Testing-Principle, Transducers, transmission and pulse-echo method, straight beam and angle beam, instrumentation, data representation, A/Scan, B-scan, C-scan. Phased Array Ultrasound, Time of Flight Diffraction. Acoustic Emission Technique Principle, AE parameters, Applications.

UNIT V **RADIOGRAPHY (RT)** **9 HOURS**

Principle, interaction of X-Ray with matter, imaging, film and film less techniques, types and use of filters and screens, geometric factors, Inverse square, law, characteristics of films - graininess, density, speed, contrast, characteristic curves, Penetrameters, Exposure charts, Radiographic equivalence. Fluoroscopy-Xero-Radiography, Computed Radiography, Computed Tomography

TOTAL: 45 HOURS

COURSE OUTCOMES:

After the course the students are expected to be able to

CO1: Explain the fundamental concepts of NDT

CO2: Discuss the different methods of NDE

CO3: Explain the concept of Thermography and Eddy current testing

CO4: Explain the concept of Ultrasonic Testing and Acoustic Emission

CO5: Explain the concept of Radiography

TEXT BOOKS:

1. Baldev Raj, M. Thavasimuthu, and T. Jayakumar," Practical Non-Destructive Testing ", Narosa Publishing House 2020.
2. Ravi Prakash, " Non Destructive testing techniques", 1st Revised edition , New Age international publishers, 2019.

REFERENCES:

1) ASM metal handbook," Non-Destructive Evaluation And Quality Control "American society Metals, Metals Park, Ohio, USA, 200, Volume-17.-2019
2) ASNT, American Society for Non Destructive Testing, Columbus, Ohio, NDT Handbook,Vol. 1, Leak Testing, Vol. 2, Liquid Penetrant Testing, Vol. 3, Infrared and Thermal Testing Vol. 4, Radiographic Testing, Vol. 5, Electromagnetic Testing, Vol. 6, Acoustic Emission Testing, Vol. Ultrasonic Testing.-2020
3) Paul E mix "Introduction to Non-destructive testing", a training guide", Wiley, 2nd Edition New M Jersey, 2021.

WEBLINK:

1. https://www.twi-global.com/technical-knowledge/faqs/what-is-non-destructive-testing

24PBAR31 **AIRCRAFT COMPONENT DRAWING LAB**

L	T	P	O	C
0	0	2	2	1

COURSE OBJECTIVES:

- To introduce the concept of design of basic structural components and to draft both manually and using modelling package

Exp. no.	EXPERIMENTS	Number of Hours
1	Projection of points in different quadrants	3
2	Projection of straight lines inclined to one plane and inclined to both planes	3
3	Projection of Simple solids such as Triangular, Rectangular, Square	3
4	Projection of solids with axis inclined to one of the reference planes	3
5	Projection of solids with axis inclined to both reference planes.	3
6	Introduction to Auto CAD/ Solid works	3
7	Design and drafting of riveted joints	3
8	Design and drafting of welded joints	3
9	Layout of typical wing structure.	3
10	Design and drafting control components	3

TOTAL =30 HOURS

COURSE OUTCOMES

CO1: Draw the projection of points and lines located in different quadrants

CO2: Draw the Projection of straight lines

CO3: Draw Projection of solids with axis inclined

CO4: Explain various commands and design joints

CO5: Obtain Multiview projections and solid models of objects using CAD tools.

REFERENCES

1. CAD/CAM Lab Manual Book by Barani Balamurali, Prabhakaran T, and Sivakumar P

24PBAR32 **AIRCRAFT STRUCTURES LAB**

L	T	P	O	C
0	0	2	2	1

COURSE OBJECTIVES:

- To make the students understand and appreciate variousprinciples and theorems involved in the theory of aircraft structures.

Exp. no.	EXPERIMENTS	Number of Hours
1	Deflection of cantilever beam in various load condition	3
2	Deflection of simply supported beam in various load condition	3
3	Verification of superposition theorem	3
4	Verification of Maxwell's reciprocal theorem	3
5	Tension test on a mild steel rod	3
6	Impact test on metal specimen	3
7	Brinell hardness test	3
8	Rockwell test	3
9	Torsion test	3
10	Fabrication of a Composite Laminate.	3

TOTAL =30 HOURS

COURSE OUTCOMES

CO1: Determine Youngs Modulus of steel.

CO2: Find the deflection of beams under various load conditions.

CO3: Describe about Hardness, impact and torsion test

CO4: Verify the Maxwell theorem.

CO5: Fabrication of composites.

REFERENCES

1. R K Rajput Strength of Materials S. Chand Publishing (6th Edition) (1 January 2019).
2. https://www.youtube.com/watch?v=qLTVHBAtbAA
3. https://www.youtube.com/watch?v=GUOKSExdjq8
4. https://www.youtube.com/watch?v=k2h8YainuC8

INDIAN KNOWLEDGE SYSTEM

L	T	P	O	C
2	0	0	0	2

COURSE OBJECTIVES:

- To Gain an understanding of Indian Knowledge System.
- To Develop an ability to apply the Indian Knowledge System to societal challenges faced today in areas such asholistic health, governance, public administration and sustainable living.
- To Promote the youths to do research in the various fields of Indian knowledge system.

UNIT I AN OVERVIEW OF INDIAN KNOWLEDGE SYSTEM 6 HOURS

Introduction- Organization of Indian Knowledge System- The IKS corpus- A Classification framework- Historicity of Indian Knowledge System -Some salient aspects of Indian Knowledge System

UNIT II PHILOSOPHICAL SYSTEM 6 HOURS

Introduction to Philosophy- Development of Indian Philosophical system - Unique features of Indian Philosophical system- Introduction to Yoga.

UNIT III GOVERNANCE AND PUBLIC ADMINISTRATION 6 HOURS

Introduction - Understanding Governance from ancient to modern times- Relevance of Arthashastra- Glimpses of Nitishastra- Vidura Niti

UNIT IV WISDOM THROUGH THE AGES 6 HOURS

Gateways of ancestral wisdoms-Introduction to Purāṇa- The Purāṇic repository- Issues of interest in Purāṇas- Introduction to Itihāsas- Key messages in Itihāsa-Wisdom through Nīti-śāstra.

UNIT V MATHEMATICS 6 HOURS

Introduction to Indian Mathematics- Unique aspects of Indian Mathematics- Indian Mathematicians and their Contributions.

TOTAL 30 HOURS

COURSE OUTCOMES:

CO1 Classify the key concepts of Indian Knowledge System and discuss the multi-faceted nature of knowledge contained in the Traditional Systems of India.

CO2 Identify the rich heritage of governance in Indian Knowledge System.

CO3 Recognize the relevance of Arthashastra in public administration.

CO4 Identify the Wisdom through Ages through Ithihasas.

CO5 Knowledge of Indian Mathematicians and their contributions.

TEXT BOOKS (LATEST EDITION):

1. Mahadevan B., Bhat V R, Nagendra Pavana R.N., Indian Knowledge System Concepts andApplication, PHI Learning Pvt. Ltd., 2022.
2. Kapoor Kapil, and Singh Avadesh Kumar, Indian Knowledge System Vol.1, DK Print World,Ltd., 2005.

REFERENCES:

1. Textbook on The Knowledge System of Bhārata by Bhag Chand Chauhan.
2. Histrory of Science in India Volume-1, Part-I, Part-II, Volume VIII, by Sibaji Raha, et al. National Academy of Sciences, India and The Ramkrishan Mission Institute of Culture, Kolkata

WEB LINKS:

1. https://onlinecourses.swayam2.ac.in/imb23_mg54/preview
2. https://digest.iimb.ac.in/2022/04/book-indian-knowledge-systems-co-authored-dr-b- mahadevan/

https://www.summarize.tech/www.youtube.com/watch?v=jcV0LIp570A

24SSKU31 **SOFT SKILLS -III**

L	T	P	O	C
2	0	0	1	2

COURSE OBJECTIVES:

- To enhance students' listening, speaking, and presentation skills for effective communication in both personal and professional contexts.
- To develop leadership qualities, decision-making, and problem-solving abilities, while fostering an understanding of non-verbal communication cues.

UNIT I LISTENING SKILLS **6 HOURS**

- Basics of LSRW Skills
- Listening Skills: Active Listening and Feedback

UNIT II SPEAKING SKILLS. **6 HOURS**

- Lateral Thinking – Left Brain/Right Brain Functionality
- Problem solving skills

UNIT III LEADERSHIP SKILLS **6 HOURS**

- Public Speaking - Essential Elements of a Successful Speech
- Voice Modulation and Effective Use of Tone
- Presentation Skills

UNIT IV NON- VERBAL CUES **6 HOURS**

- Facial Expressions, Body Language, Gestures, Posture and Eye Contact
- Professional Grooming and Appearance

UNIT V WORK PLACE ETHICS AND PROFESSIONALISM **6 HOURS**

- Workplace Etiquette and Professional Behavior
- Integrity, Responsibility, and Ethical Decision-Making

TOTAL 30 HOURS

COURSE OUTCOMES:

Upon completion of this course, the students will be able to

CO1: acquire the ability to actively listen, provide constructive feedback, and enhance comprehension skills.

CO2: effectively deliver `speeches using appropriate voice modulation and presentation techniques.

CO3: understand different leadership traits, develop critical decision-making and problem-solving skills.

CO4: foster better communication and interaction in both professional and social contexts.

CO5: develop a strong sense of professional ethics and etiquette to maintain integrity and professionalism.

REFERENCES:

- Guffey, Mary Ellen, and Dana Loewy. *Essentials of Business Communication*. 11th ed., Cengage Learning, 2017.
- Northouse, Peter G. *Leadership: Theory and Practice*. 8th ed., Sage Publications, 2018.
- Ciulla, Joanne B. *Ethics, the Heart of Leadership*. 2nd ed., Praeger, 2014.

24IBAR31 **INTERNSHIP-I**

L	T	P	O	C
0	0	2	1	1

COURSE OBJECTIVES:

- The goal of student internship program is to have the professional training and growth in various organizations and all types of Aviation companies.

Purpose

The purpose of the student internship program is to provide students with an opportunity to gain workplace skills and learn more about corporate field. This is also an opportunity to contribute to the local community by reaching out to future professionals.

Parties Involved

The student internship program involves two parties:

1. The Intern Supervisor (The Company)
2. The Intern (The Student)

Category	Requirements
Status Group	Group Internship Maximum of 5 person for one company.
Length	Period of 2 weeks
Hours	Hours will be agreed upon between the intern and the Intern Supervisor.
Reports To	The Intern Supervisor
Required Meetings	1. Attend Orientation 2. Attend meetings as requested by the Intern Supervisor.
Duties	1. Perform all duties as assigned by the Intern Supervisor 2. If performing the internship for school credit, the intern will be responsible for providing and submitting the required forms to the Intern Supervisor.

Evaluation process for Internship Reporting:

Internal Marks for Internship Report	40 marks
External Marks for Internship Report	60 marks

Certification	Content	Presentation
20 marks	**20 marks**	**20 marks**

COURSE OUTCOME:

CO1: To Contribute to organizations of all types and sizes by managing critical internship.

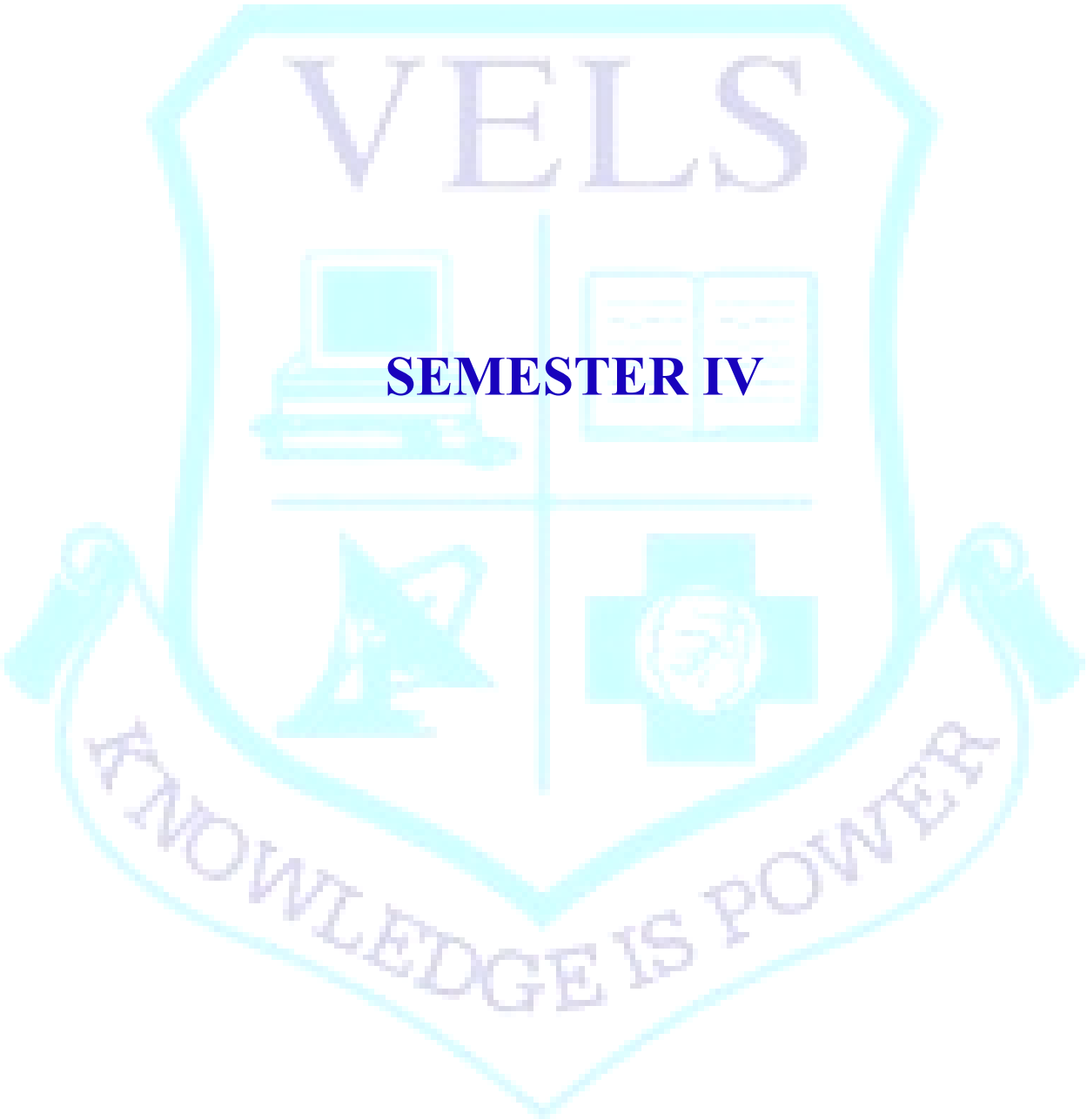
CO2: To provide creative solutions to key challenges.

CO3: To design marketing strategies.

CO4: To Provide a variety of ways to engage in experiential Learning

CO5: To lay the foundation for strong relationship and subsequent job offers

CO6: To apply the Knowledge and skills acquired in the classroom to a professional context



SEMESTER IV

24LTAM41 **TAMIL-IV**

L	T	P	O	C
2	0	0	1	2

மரபுக்கவிதை,புதுக்கவிதை,ஊடகத்தமிழ்,கணினித்தமிழ்

பாடத்திட்ட நோக்கம்:

தமிழர்தம் தொன்மைச் சிறப்பையும், பண்பாட்டுச் செழுமையையும் உலகிற்குப் பறைசாற்றும் சங்க இலக்கியங்களான எட்டுத்தொகை, பத்துப்பாட்டு நூல்களை அறியச் செய்தல், அதன்வழி பண்டைத் தமிழரின் விழுமியங்களை எடுத்துரைத்தல், இலக்கால இலக்கிய வகைமையான நாடக இலக்கியத்தை அறியச் செய்தல், ஊடகங்களில் தமிழின் பயன்பாடு, கணினியில் தமிழ்ப்பயன்பாடு என்பனவற்றை மாணவர்களுக்கு கற்றுக்கொடுத்தல், மாணவர்களை ஆளுமை மிக்கவர்களாக உருவாக்கி, போட்டித்தேர்வுகளுக்குத் தயார் செய்தல் என்பன இந்தப் பாடத்திட்டத்தின் முக்கிய நோக்கமாகும்.

அலகு 1: மரபுக்கவிதை 8 மணி நேரம்

1. பாரதியார் - பாரத தேசம் என்னும் தலைப்பில் ஆறு பாடல்கள். (பாடல் எண்கள் 1, 6, 7, 9, 12, 13)
2. பாரதிதாசன் – தமிழுக்கும் அமுதென்று பேர் என்னும் தலைப்பிலான கவிதை.
3. தேசிக விநாயகம் பிள்ளை - உடல் நலம் பேணல் என்னும் தலைப்பிலான கவிதை
4. முடியரசன் - காவியப் பாவை – "புண்படுமா" என்னும் கவிதை.

அலகு 2: புதுக்கவிதை 8 மணி நேரம்

1. நா. காமராசன் - *கறுப்பு மலர்கள்* தொகுப்பில் *காகிதப்பூக்கள்* என்னும் தலைப்பிலான கவிதை.
2. அப்துல் ரகுமான் - *ஆலாபனை* தொகுப்பில் *போட்டி* என்னும் தலைப்பிலான கவிதை
3. ஆண்டாள் பிரியதர்ஷினி – *முத்தங்கள் தீர்ந்துவிட்டன* தொகுப்பில் *'இங்கே வரும் போது'* என்னும் தலைப்பிலான கவிதை

அலகு 3 :**ஊடகத் தமிழ்**

இதழியல் - ஊடக வகைகள் - தலையங்கம்- நிகழ்ச்சியை செய்தியாக மாற்றுதல்- கருத்துப் பரிமாற்றம் நாடகம், திரைப்படம்,- வானொலி-

தொலைக்காட்சி- மொழி நடையின் தன்மை -

அலகு 4 : **கணினித் தமிழ்**

கணினித் தமிழ்: கணினித் தமிழின் அடிப்படையும் பயன்பாடும் - கணிப்பொறியின் வரலாறும் வளர்ச்சியும், கணினியும் தமிழும், விசைப்பலகை (Keyboard) - எழுத்துருக்கள் (Fonts) - தமிழைத் தட்டச்சு செய்ய உதவும் மென்பொருள்கள், தமிழைத் தட்டச்சு செய்யும் முறைகள் - தமிழ்த் தட்டச்சுப் பயிற்சி - இணையமும் தமிழ்ப் பயன்பாடும் - தேடுபொறி (Search) - வலைப்பூ (Blog), மின்னூலகம் (Online e-Library), - மின்னகராதி(e-Dictionary), - மின் செய்தித்தாள் - e-Paper, - இணையவழித் தமிழ்க் கற்றலும்-கற்பித்தலும் - மின்வழிக் கற்றல் - e Learning.

மொத்தம்: 30 மணி நேரம்

பார்வை நூல்கள்

8. **தமிழர் நாகரிகமும் பண்பாடும்,** டாக்டர் அ. தட்சிணாமூர்த்தி, ஐந்திணைப் பதிப்பகம், 2001.
9. **தவறின்றித் தமிழ் எழுதுவோம்**, மா. நன்னன், ஏகம் பதிப்பகம், 1999.
10. **தவறின்றித் தமிழ் எழுத** - மருதூர் அரங்கராசன், ஐந்திணைப் பதிப்பகம், 2003.
11. **தமிழ் இலக்கிய வரலாறு**, வரதராசன், மு., புது தில்லி : சாகித்திய அக்காதெமி, 2002.
12. **புதிய தமிழ் இலக்கிய வரலாறு**, நீல. பத்மநாபன், சிற்பி பாலசுப்ரமணியம், சாகித்திய அகாடெமி, 2007.
13. **செம்மொழி தமிழின் சிறப்பியல்புகள்** - முனைவர் மறைமலை இலக்குவனார்; https://www.youtube.com/watch?v=HHZnmJb4jSY
14. **பாடநூல் தேடலுக்கான இணையம் -** https://archive.org/

24LFRE41 **FRENCH-IV**

L	T	P	O	C
2	0	0	1	2

COURSE OBJECTIVES:

The lessons are being chosen:

1) To propose to do something and respond to a proposal
2) To respond to a request
3) To accuse, to blame
4) To complain, to protest
5) To express cause and consequence
6) To express opinion about facts

UNIT I Entreprendre **6 HOURS**

- Les pronoms démonstratifs, les pronoms interrogatifs

UNIT II Vous avez gagne **5 HOURS**

- Les pronoms en et y, les formation des adverbes en-ment

UNIT III Ne quittez pas **4 HOURS**

- La mise en relief (c'est ..... qui, c'est …….que).

UNIT IV Argent trop cher **4 HOURS**

- l'opposition- toujours/ne…jamais.

UNIT V Le pétrole fou **5 HOURS**

- la cause et la consequence

UNIT VI Parlez-moi d'amour **6 HOURS**

- le conditionnel present, le gérondif.

TOTAL 30 HOURS

COURSE OUTCOMES:

1) The students would be able to propose to do something and respond to a proposal
2) The students would be able to respond to a request
3) The students would be able to accuse, to blame
4) The students would be able to complain, to protest
5) The students would be able to express cause and consequence
6) The students would be able to express opinion about facts

REFERENCES:

1. LATITUDES 1 (A1/A2) MÉTHODE DE FRANÇAIS - Régine Mérieux and Yves Loiseau
2. SAISON A1 - MÉTHODE DE FRANÇAIS - Marie-Noëlle Cocton, Élodie Heu, Catherine Houssa, Émilie Kasazian

24LHIN41 **HINDI-IV**

L	T	P	O	C
2	0	0	1	2

Course Objectives :

- To develop interest in various style of Modern and Contemporary Hindi Poetry
- To enable them to know about the Official Language Hindi
- To enable them to converse in Hindi

UNIT I : भारतेन्दु हरिश्चंद्र की मुखरियाँ – 4
Bharatendu Harishchandra ki Mukhariyan-4. 6hrs.

UNIT II : सुमित्रानंदन पंत कृत 'भारतमाता ग्रामवासी' (कविता)
'Bharatmata Gramavasi' (Kavita) by Sumitranand Pant 6hrs.

UNIT III: ज्ञानेन्द्रपति कृत 'बीज व्यथा' (कविता)
'Beej Vyatha' (Kavita) by Gyanendrapati 6hrs.

UNIT IV: राजभाषा हिन्दी का परिचय, अनुच्छेद से प्रश्न तनमाण
Introduction to Official Language Hindi, framing questions from passages 6hrs.

UNIT V : मंच संचालन (साक्षात्कार) का परिचय
Introduction to Stage Management(Interview) 6hrs.

Total: 30hrs

Course Outcome:

At the end of this course Students will

CO1 CO2 & CO3 Familiar with the different poetic expressions of Modern & Contemporary Hindi Poetry

CO4 Know the importance of official language Hindi

CO5 Become conversant in Hindi

TextBook:

Bhartendu Harishchandra, Ed Ramji Yadav, Bharatendu Sanchayan, Bharatiya Pustak Parishad, 2011.

Sumitranandan Pant, Gramya, Lokbharti Prakashan, 2017.

Gyanedrapati, Gyanendrapati, Prabhakar Publication, 2022.

Bhatia Kailashchandra, Rajbhasha Hindi, Vani Prakashan,2018.

Reference Book:

Mahesh Sharma, Bhashan Kala, Prabhat Prakashan, 2019.

Raghavan T.E.S. Rajbhasha Hindi Amarkosh

Weblinks:

-http://kavitakosh.org

Bharatendu Harishchandra

https://www.amarujala.com/kavya/kavya-charcha/bhartendu-harishchandra-poems-naye-jamane-ki-mukariyan?page=5

Sumitranandan Pant- http://kavitakosh.org

https://www.hindiadda.com/beej-vyatha-gyanendrapati/

Hindi Rajbhasha: https://navodaya.gov.in

24LENG41 **ENGLISH-IV PROFESSIONAL ENGLISH**

L	T	P	O	C
2	0	0	1	2

COURSE OBJECTIVES:

- To improve professional vocabulary and language usage appropriate for various fields and industries.
- To practice critical thinking and problem-solving skills through case studies and discussions.
- To prepare students for job interviews and career advancement through professional English proficiency.

UNIT I REPORT WRITING AND DATA INTERPRETATION 6 HOURS

- Report Writing – Business Report, Progress Report, Technical Report
- Instructions and Recommendations
- Interpretation of Graphs, Charts and Pictures

UNIT II PROFESSIONAL WRITING-I 6 HOURS

- Agenda
- Minutes of the Meeting
- Review Writing
- Circular

UNIT III PROFESSIONAL WRITING-II 6 HOURS

- Paragraph Writing
- Essay Writing
- Proposal Writing
- E-mail Writing

UNIT IV SPEECH WRITING 6 HOURS

- Tailoring the Speech for the Target Audience
- Writing for Professional Events - Welcome Address, Vote of Thanks
- Maintaining Clarity, Conciseness, and Precision

UNIT V MEDIA WRITING 6 HOURS

- Introduction to Media Writing - News, Feature, Editorial, and PR
- Writing for Social Media and Digital Platforms, Freelance Writing

TOTAL 30 HOURS

COURSE OUTCOMES:

At the end of this course students will be able to:

CO1: demonstrate proficiency in language use.

CO2: master the nuances of Spoken and Written Communication skills in professional contexts.

CO3: develop confidence and clarity in Professional English usage.

CO4: organize their ideas coherently in writing for formal contexts.

CO5: exhibit their oral and written communication skills for professional contexts such as presentations and meetings.

REFERENCES:

1. Professional English by Meenakshi Raman and Sangeetha Sharma -2018.
2. General English for all competitive examinations by S.C.Gupta -2016.
3. Ibbotson, Mark. *Professional English in Use: Engineering: Technical English for Professionals*. Cambridge University Press, 2009.
4. Ruiz-Garrido, Miguel F., Juan C. Palmer-Silveira, and Inmaculada Fortanet-Gómez, eds. *English for professional and academic purposes*. Vol. 22. Amsterdam: Rodopi, 2010.

24EVS041 **ENVIRONMENTAL STUDIES**

L	T	P	O	C
3	0	0	2	3

COURSE OBJECTIVES:

- To inculcate the importance of environmental pollution, preservation of nature and environmental management for human welfare.

UNIT I HUMAN COMMUNITIES AND THE ENVIRONMENT 9 HOURS

The man-environment interaction: Humans as hunter-gatherers; Mastery of fire; Origin of agriculture; Emergence of city-states; Great ancient civilizations and the environment, Indic Knowledge and Culture of sustainability; Middle Ages and Renaissance; Industrial revolution and its impact on the environment;

Environmental Ethics and emergence of environmentalism: Anthropocentric and eco-centric perspectives (Major thinkers); The Club of Rome- Limits to Growth; UN Conference on Human Environment 1972; World Commission on Environment and Development and the concept of sustainable development; Rio Summit and subsequent international efforts.

UNIT II NATURAL RESOURCES AND SUSTAINABLE DEVELOPMENT 9 HOURS

Renewable and non-renewable resources - Natural resources and associated problems. a) Forest resources b) Water resources c) Mineral resources d) Food resources e) Energy resources: f) Land resources; Role of an individual in conservation of natural resources- Equitable use of resources for sustainable lifestyles.

Introduction to sustainable development: Sustainable Development Goals (SDGs)- targets and indicators, challenges and strategies for SDGs.

UNIT III ECO SYSTEM AND BIODIVERSITY 9 HOURS

Ecosystems and ecosystem services: Major ecosystem types in India and their basic characteristics- forests, wetlands, grasslands, agriculture, coastal and marine; Ecosystem services- classification and their significance.

Biodiversity and its distribution: Biodiversity as a natural resource; Levels and types of biodiversity; Biodiversity in India and the world; Biodiversity hotspots; Species and ecosystem threat categories. Threats to biodiversity and ecosystems: Land use and land cover change; Commercial exploitation of species; Invasive species; Fire, disasters and climate change. Major conservation policies: in-situ and

ex-situ conservation approaches;

UNIT IV ENVIRONMENTAL POLLUTION AND HEALTH 9 HOURS

Understanding pollution: Production processes and generation of wastes; Assimilative capacity of the environment; Definition of pollution; Point sources and non-point sources of pollution; Causes, effects and control measures of a) Air pollution b) Water pollution c) Soil pollution d) Marine pollution e) Noise pollution f) Thermal pollution g) Nuclear hazards. Solid waste Management. Causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution. Pollution case studies.

UNIT V ENVIRONMENTAL TREATIES AND LEGISLATION 9 HOURS

Major International Environmental Agreements: Convention on Biological Diversity (CBD); Cartagena Protocol on Biosafety; Nagoya Protocol on Access and Benefit-sharing; Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES); Ramsar Convention on Wetlands of International Importance; United Nations Convention to Combat Desertification (UNCCD); Vienna Convention for the Protection of the Ozone Layer;

Environmental laws:

Environment Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act - Issues involved in enforcement of environmental legislation. Public awareness.

TOTAL 45 HOURS

COURSE OUTCOMES:

After the course the students are expected to be able to

CO-1: Gain insights into the international efforts to safeguard the Earth's environment and resources.

CO-2: Understand the concept of natural resources; identify types of natural resources, their distribution and use with special reference to India.

CO-3: Understand the concepts of ecosystems, biodiversity and conservation.

CO-4: Sensitize themselves to adverse health impacts of pollution

CO-5: Understand the sectoral effects on the local, regional, and global environmental issues.

TEXT BOOKS:

1. Fisher, Michael H. (2018) An Environmental History of India- From Earliest Times to the Twenty-First Century, Cambridge University Press.
2. William P. Cunningham and Mary Ann Cunningham, Environmental Science: A Global Concern 14th Edition, 2021.
3. Sinha, N. (2020) Wild and Wilful. Harper Collins, India.
4. Climate change: Science and politics (2021), Centre science and Environment, New Delhi,

REFERENCES:

1. Daniel B. Botkin and Edward A. Keller, **Environmental Science: Earth as a Living Planet,** 9th Edition, New Age International 2022.
2. Jadhav H and Bhosale VM, Environmental Protection and Laws. Himalaya Publishing House, Delhi 284pgs 2023.

WEB SITE LINKS:

https://easyengineering.net/ge6351-environmental-science-and/
https://learnengineering.in/ge8291-environmental-science-and-engineering
https://cpcb.nic.in/ standards/

24CBAR41 **AIRCRAFT INSTRUMENTS**

L	T	P	O	C
3	0	0	2	3

COURSE OBJECTIVES:

- To inculcate the students with the basic knowledge and understanding of various aircraft systems, instruments, and their applications.
- To educate students with the safety precautions and methodology of handling aircraft systems.

UNIT I **PRESSURE PORTS AND TERRESTIAL MAGNETISM** **9 HOURS**

Working and Functions of pressure ports, Requirement of Pitot tube, Requirement of Static source, Errors in Pitot and Static source, The magnet, Magnetic field, Magnetic dip and variation, Field strength, Directive force.

UNIT II **DECODING AND UNDERSTANDING** **9 HOURS**

Airspeed indicator (ASI)- construction and principles of operation - speed indications (IAS) - meaning of colored sectors - maximum speed indicator, VMO, MMO pointer – errors Altimeter - construction and principles of operation - display and setting – errors - correction tables – tolerances; Mach Meter - construction and principles of operation - VSI (IVSI) - construction and principles of operation - display and setting – errors

UNIT III **GYROSCOPIC INSTRUMENTS AND MAGNETIC COMPASS** **9 HOURS**

Gyro fundamentals - theory of gyroscopic forces (stability, precession) - types, - apparent drift - random drift; Directional gyro - construction and principles of operation; - turn and acceleration errors - application, uses of output data; Attitude indicator (vertical gyro) - construction and principles of operation - turn and acceleration errors - application, uses of output data; Turn and bank indicator (rate gyro) - construction and principles of operation - application, uses of output data, Turn coordinator. Magnetic Compass - construction and principles of operation, Remote reading compasses (Gyro-Magnetic Compass): Principle of Construction, Flux Valve, Compass Components.

UNIT IV **MORDERN SYSTEMS** **9 HOURS**

Introduction, working principle, usage of Inertial Navigation Systems, Inertial Reference System, Radio Altimeter, Auto Pilot.

UNIT V WARNING DEVICES 9 HOURS

Flight Warning System, Aerodynamic Warnings, Ground Proximity Warning System (GPWS), Airborne Collision and Avoidance System (ACAS), Flight Data Recorder, Cockpit voice recorder.

TOTAL: 45 HOURS

COURSE OUTCOMES:

After the course the students are expected to be able to

CO1: Describe the working principles of pressure instruments in an aircraft.

CO2: Summarize the operations of Gyroscopic Instruments in an aircraft.

CO3: Illustrate the concepts of advanced Gyroscopic instruments in an aircraft.

CO4: Discuss the ideas of Advanced navigation systems.

CO5: Explain the technical aspects of aircraft warning devices and their working principle.

TEXT BOOKS:

1. Pallet, E.H.J., "Aircraft Instruments & Principles", Pitman & Co., 2020.
2. Nordian, "Airframe and Systems", KLM flight academy, 2020.
3. CAE Oxford, "Instrumentation"
4. CAA, "CAP 459 Part-I & II Civil Aircraft Inspection Procedures", Sterling Book House, 2019.
5. Jeppesesn, "A&p Technician Airframe", Jeppesen Sanderson; Illustrated edition (30 May 2020).
6. Larry Reithmaier, Ron Sterkenburg, "Standard Aircraft Handbook for Mechanics and Technicians", McGraw-Hill Education; 7th edition (16 September 2022).

REFERENCES:

1. Dale Ph.D. De Remer, "Aircraft Systems for Pilots", Aviation Supplies & Academics Inc, 4th Edition, (30 January 2020).
2. Chris Binns, "Aircraft Systems", Wiley-IEEE Press; 1st edition (28 December 2019).
3. David Harris, "Ground Studies for Pilots - Flight Instruments and Automatic Flight Control Systems", Wiley India Pvt Ltd; Sixth edition (7 July 2020).

WEB LINKS:

1. https://www.faa.gov/documentlibrary/media/advisory_circular/150-5210-15a/150_5210_15a.pdf
2. https://www.faa.gov/regulations_policies/handbooks_manuals/aircraft/
3. https://soaneemrana.org/onewebmedia/5AN3%20AIRCRAFT%20SYSTEMS%20UNIT%20I%20to%20V%20%20NOTES.pdf

24CBAR42 **AIR REGULATION**

L	T	P	O	C
3	0	0	2	3

COURSE OBJECTIVES:

To improve students' knowledge of international air law, conventions, and recommended practices to better serve the aviation industry.

UNIT I **INTERNATIONAL AGREEMENTS AND ORGANIZATIONS** **9 HOURS**

The Convention of Chicago, The International Civil Aviation Organization, Other International Agreements, PIC authority and responsibility regarding safety and security, Operators and pilot's liabilities, Commercial practices, and associated rules.

UNIT II **AIRWORTHINESS, NATIONALITY & REGISTRATION MARKS AND PERSONNEL LICENSING** **9 HOURS**

Airworthiness of Aircraft (Annex 8), Aircraft Nationality and Registration Marks (Annex 7), Personnel Licensing (Annex 1), Rules of the Air (Annex 2).

UNIT III **PANS-OPS AND ATS** **9 HOURS**

Procedures for Air Navigation Services - Aircraft Operations (PANS-OPS) Doc. 8168, Foreword – introduction, Definitions and abbreviations, Departure procedures, Approach procedures, holding procedures, Altimeter setting procedures, Secondary surveillance radar- transponder- operating procedures; Air Traffic Services – Annex 11, General, Air Traffic Control, Flight Information Service, Alerting Service, identification of RNP types and the identification of ATS routes, Rules of the Air and Air Traffic Services (ICAO Doc. 4444 – RAC/501/11 and ICAO Doc. 7030 – Regional Supplementary Procedures), general air traffic services operating practices, Area Control Service, Approach Control Service, Aerodrome Control Service, Flight Information Service and Altering Service, Use of radar in Air Traffic Services.

UNIT IV **AIS AERODROMES, FACILITATION AND SEARCH & RESCUE** **9 HOURS**

Aeronautical Information Service (Annex 15 and AIP, India); Aerodromes Annex 14, Vol. 1 & 2), Visual aids for navigation, Visual aids for denoting obstacles, Visual aids for denoting restricted use of areas, Emergency and other services; Facilitation (Annex 9); Search and Rescue, Annex 12 – definitions-Organization - Operating procedures, Search and Rescue Signals.

UNIT V **SECURITY, ACCIDENT INVESTIGATION, AIS, CAR SECTIONS:2, 7 & 8 AND NATIONAL LAW** **9 HOURS**

Security Annex 17 – General – aims and objectives; Aircraft Accident Investigation (based on Annex 13); CARs: Sections 2, 7 and 8; National Law – National Law and differences to relevant ICAO Annexes and CARs. Indian aircraft act 1934-section 1, 2, 8, 10, 11A, 11B, 17 & 18 (3/9); Aircraft Rule 1937- Rule #. 1-19, 21- 29A, 30, 33, 37A, 38-48, 50, 52, 53, 55, 65, 67, 67A, 67B, 68-70, 76, 79-89, 133A, 134, 140, 140 (AB&C), 15 & 161; Schedule I, II, VI, & XI; Indian Aircraft Rules 1920- Rule #53-64, Aircraft Rules 1954 (Public Health Rules), Aircraft Rules 2003 (Carriage of Dangerous Goods)

TOTAL: 45 HOURS

COURSE OUTCOMES:

After the course the students are expected to be able to

CO1: Explain the international agreements and organization.

CO2: Explain the Aircraft Nationality and Registration Marks.

CO3: Investigate the procedure for air navigation.

CO4: Explain the operating regulation for aerodrome.

CO5: Illustrate the Indian aircraft rules.

TEXT BOOKS:

1. ICAO Annex – 8 to the convention on international civil aviation international standards and recommended practices.
2. RK Bali, “Air Regulations”, Sterling Book House (1 January 2021).
3. OXFORD ATPL GRN TRAINI SERIES AIR LAW 1.
4. Nordian, Air Law & ATC Procedures, Edition 7.2 (2020).
5. V. Krishnan & S.R. Iyer, “A Handbook on Air Regulations for Pilots”, The English Book Store (The Aviation People) (1 January 2020).

REFERENCES:

1. Nordian, Air Law & ATC Procedures, Edition 7.2 (2020).
2. V. Krishnan & S.R. Iyer, “A Handbook on Air Regulations for Pilots”, The English Book Store (The Aviation People) (1 January 2020).

WEB LINKS:

1. https://www.dgca.gov.in/digigov portal/?dynamicPage=civilAviationRequirements/6/0/viewDynamicRulesReq
2. https://iclg.com/practice-areas/aviation-laws-and-regulations/india
3. https://www.icao.int/Meetings/anconf12/Document%20Archive/an02_cons%5B1%5D.pdf

24PBAR41 **AIRCRAFT MAINTENACE LAB**

L	T	P	O	C
0	0	2	1	1

COURSE OBJECTIVES:

- To develop practical skills, hand-on experience and professional understanding of Aircraft Maintenance Practices.

Exp. no.	EXPERIMENTS	Number of Hours
1	Three View Diagram- simple object, structural member, and joints.	3
2	Study of precision measuring instruments.	3
3	Hydraulic system- handling procedures.	4
4	Pneumatic system -Handling Procedures.	4
5	Visual inspection of various types of surface defects.	4
6	Study of aircraft station numbers	4
7	Non-Destructive testing	4
8	Study of lubrication system	4
		TOTAL =30 HOURS

REFERENCES

1. Airframe and Powerplant Mechanics (AC 65-15A)-Airframe Hand Book FAA Civil.-2022
2. Aircraft Maintenance and Repair By Kroes, Watkin and Delph.-2017
3. Aviation Maintenance Technician Hand book by FAA-2019
4. Michael Kroes, William Watkins, Frank Delp, Ronald Sterkenburg, “Aircraft Maintenance andRepair, Seventh Edition”, McGraw-Hill Education, 30 March 2018.

24PBAR42 **PROPULSION LAB**

L	T	P	O	C
0	0	2	1	1

COURSE OBJECTIVES:

- To develop the basic knowledge of the students in gas turbine engine and its assembly and dismantling.
- To develop the basic knowledge of the students in piston engine and its assembly and dismantling.
- To evaluate calorific value of the fuels.

Exp. no.	EXPERIMENTS	Number of Hours
1	Study of aircraft piston engines and jet engines and its components	4
2	Study of forced convective heat transfers	4
3	Study of free convective heat transfers	4
4	Cascade testing of axial compressor blade row	4
5	Determination of heat of combustion of fuel	4
6	Combustion performance studies in jet engine combustion chamber	4
7	Study of free jet	3
8	Study of wall jet	3

TOTAL =30 HOURS

COURSE OUTCOMES

On completion of the course students will be able to

CO1: Illustrate the concept of piston engine and gas turbine engine.

CO2: Exhibit the concept of jet characteristics.

CO3: Estimate heat transfer coefficient the free and forced convection heat transfer.

CO4: Perceive the calorific value of a various fuels.

CO5: Manipulate the performance of propeller.

REFERENCES

1. Jack D. Mattingly , “Elements of Propulsion: Gas Turbines and Rockets”, American Institute of Aeronautics & Astronautics, 15 September 2018.

2. https://nptel.ac.in/content/storage2/courses/101101001/downloads/Intro-Propulsion-Lect-25.pdf
3. J.B.Will, N.P.Kruyt, C.H.Venner, An experimental study of forced convective heat transfer from smooth, solid spheres", International Journal of Heat and Mass Transfer Volume 109, June 2019, Pages 1059-1067.
4. http://courseware.cutm.ac.in/courses/jet-propulsion/
5. https://uta.pressbooks.pub/appliedfluidmechanics/chapter/experiment-5/
6. https://uta.pressbooks.pub/appliedfluidmechanics/chapter/experiment-6/
7. https://www.youtube.com/watch?v=uXW_yvfnmm8&ab_channel=AnkitJainEducation
8. https://www.youtube.com/watch?v=_C1Y8fvXlQQ&ab_channel=AshishUtage
9. https://chem.libretexts.org/Bookshelves/Introductory_Chemistry/Book%3A_Introductory_Chemistry_(CK-12)/17%3A_Thermochemistry/17.14%3A_Heat_of_Combustion

24SBAR41 **INDUSTRY ORIENTED EMPLOYABILITY SKILLS**

L	T	P	O	C
1	0	2	1	2

COURSE OBJECTIVES:

- To equip students with essential career skills and understanding employer-employee Expectations
- To develop practical job search strategies, including resume writing and interviewing skills.
- To develop students' awareness of current national and international affairs to foster wellrounded, informed professionals.

UNIT I- INTRODUCTION TO CAREER SKILLS 6 Hours

- Overview of Career Development
- Importance of Career Skills in Personal and Professional Growth
- Setting Career Goals and Objectives

UNIT II - EMPLOYEE/EMPLOYER EXPECTATIONS 6 Hours

- Work-Life Balance, Opportunities for Growth and Development
- Creating a Positive Organizational Culture, Adherence to Company Policies and Ethical Standards
- Building Strong Employer-Employee Relationships

UNIT III - CURRENT AFFAIRS 6 Hours

- National Affairs
- International Affairs
- Technology, Sports

UNIT IV - JOB PREPAREDNESS 6 Hours

- Bio-data, Resume, CV
- Social Media –Professional Presence (LinkedIn, FB, Instagram, Twitter)
- Cover Letter.

UNIT V - INTERVIEW SKILLS 6 Hours

- Types of Interviews and Interview Strategies
- Group Discussion - Mock GD – Mock Interview

TOTAL HOURS= 30

COURSE OUTCOMES

On completion of the course students will be able to

CO1: Set realistic career goals and develop a strategic plan for their personal and professional growth.

CO2: Understand the expectations of aviation employers and align their skills accordingly.

CO3: Develop the ability to stay updated on national and international affairs.

CO4: Effectively prepare resumes and perform well in job interviews.

CO5: Confidently handle various interview formats and demonstrate effective communication skills.

REFERENCES

1. Cracking the Coding Interview: 189 Programming Questions and Solutions" by Gayle McDowell
2. The Art of Interviewing: How to Ace Your Next Job Interview" by Peter Roberts
3. Vaghela, Kiran, and Urvashi Kaushal. "Students' Employability: An Empirical Study." Resilience and Transformation for Global Restructuring: Resilience and Transformation for Global Restructuring (2022)

24SNSS41 **YOGA EDUCATION**

L	T	P	O	C
0	0	2	1	1

COURSE OBJECTIVES:

The students will be able to:

- Understand the philosophy, aims, and health benefits of Yoga.
- Gain practical knowledge of yogic postures, breathing techniques, and relaxation practices.
- Apply yogic methods for stress reduction, emotional balance, and focus enhancement.
- Incorporate Yoga as a tool for lifestyle improvement, well-being, and inner awareness.

UNIT I INTRODUCTION TO YOGA 05 HOURS

Definition and meaning of Yoga – Classical and modern perspectives. -Philosophy and objectives of Yoga-Benefits of Yoga for physical, mental, and emotional health -Relevance of Yoga in daily life, especially for students and professionals - Guidelines for safe and mindful Yoga practice

UNIT II YOGA PRACTICES – ASANAS AND BREATHING 05 HOURS

Loosening and warm-up exercises Neck, shoulder, spine, and joint movements - Standing AsanasTadasana, Trikonasana, Vrikshasana - Sitting AsanasVajrasana, Ardha Matsyendrasana, Bhadrasana - Prone and Supine AsanasBhujangasana, Shalabhasana, Pavanamuktasana - Breathing Practices (Pranayama)Anulom Vilom, Bhramari, Sheetali, Sheetkari - Relaxation TechniquesDeep Relaxation Technique (DRT)

UNIT III YOGA FOR MENTAL WELL-BEING & LIFESTYLE MANAGEMENT 05 HOURS

Ecosystems and ecosystem services: Major ecosystem types in India and their basic Role of Yoga in managing stress, anxiety, and fatigue - Importance of meditation and breath regulation - Basics of meditation: breath-based and mindfulness - Yogic lifestyle guidelines – diet, discipline, sleep, and conduct - Integrating Yoga into student routine for balance and productivity

TOTAL 15 HOURS

COURSE OUTCOMES:

CO1: Explain the meaning and relevance of Yoga for overall well-being.

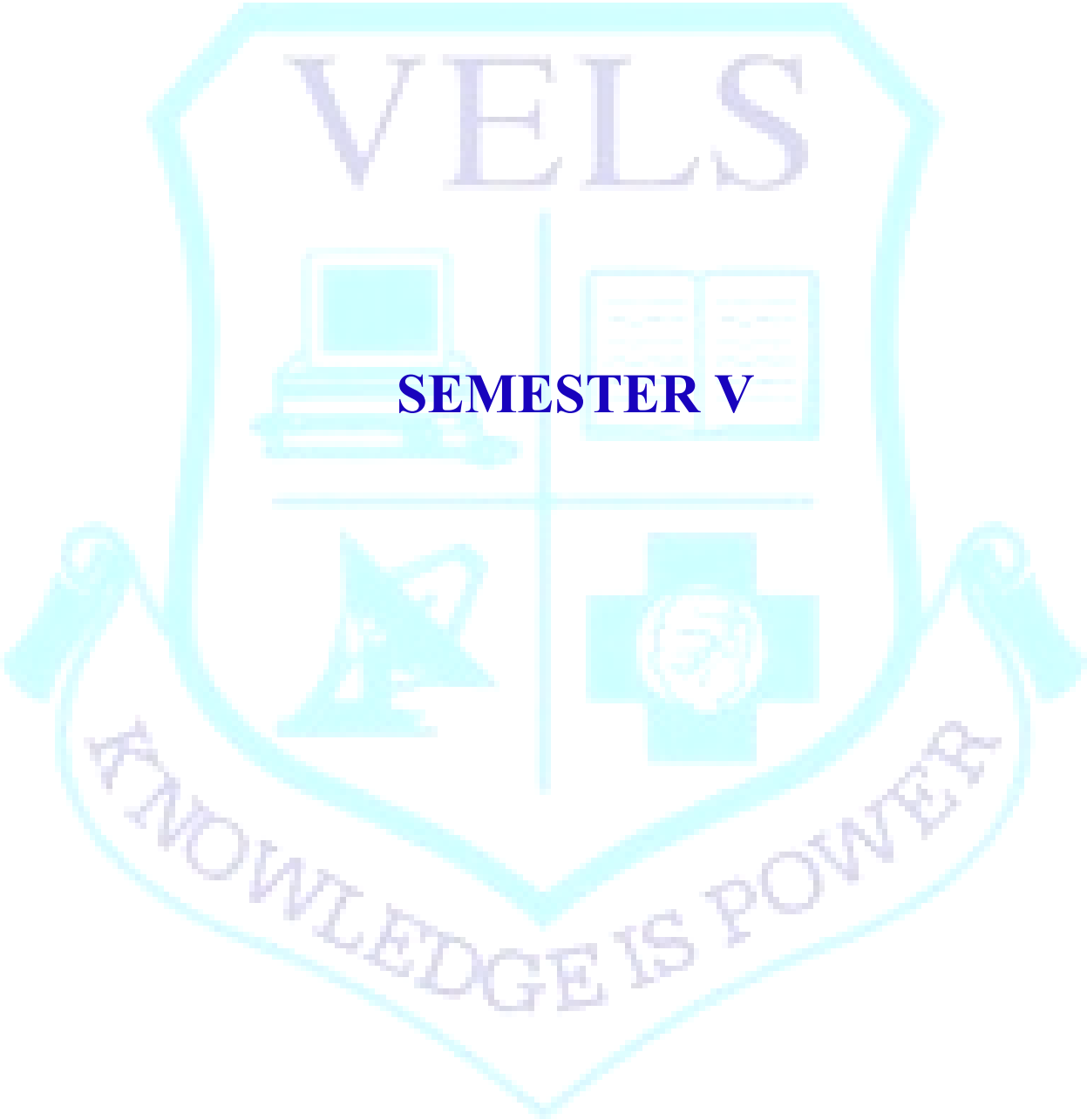
CO2: Demonstrate basic asanas and breathing techniques with proper alignment.

CO3: Practice guided relaxation and introductory meditation.

TEXT BOOKS:

1. Ministry of AYUSH. (2023). Common Yoga Protocol. Government of India
2. Swami Satyananda Saraswati. Asana, Pranayama, Mudra, Bandha. Bihar School of Yoga
3. Dr. R. Nagarathna & Dr. H. R. Nagendra. Yoga for Students. SVYASA

4. NCERT. (2020). Yoga – A Healthy Way of Living (Upper Primary and Secondary)



SEMESTER V

24CBAR51 **ARTIFICIAL INTELLIGENCE IN AVIATION**

L	T	P	O	C
3	0	0	2	3

COURSE OBJECTIVES:

•Understand the foundational concepts and principles of artificial intelligence (AI) as applied specifically to the aviation industry.

•Explore practical applications of AI in aircraft operations, maintenance, air traffic management, passenger services, and aviation safety.

•Analyse case studies and real-world examples to illustrate the impact of AI on efficiency, safety, and passenger experience in aviation.

UNIT I **INTRODUCTION TO AI IN AVIATION** **9 HOURS**

Definition and Scope of AI in Aviation- Historical Development of AI in Aviation- Benefits of AI in Aviation- Challenges and Limitations- AI Technologies and Techniques in Aviation- Future Trends and Innovations.

UNIT II **AI FOR AIRCRAFT OPERATIONS AND MAINTENANCE** **9 HOURS**

Predictive Maintenance using AI- Fault Detection and Diagnostics- Proactive Maintenance Strategies- Optimization of Flight Schedules and Route Planning- Integration with Operational Systems.

UNIT III **AI FOR AIR TRAFFIC CONTROL** **9 HOURS**

Automated Air Traffic Control Systems- Traffic Flow Management and Congestion Avoidance- Collision Detection and Avoidance Systems- Decision Support Tools for Controllers- Integration with Next-Generation Technologies.

UNIT IV **AI FOR PASSENGER EXPERIENCE AND SERVICES** **9 HOURS**

AI-driven Customer Service Enhancements- Predictive Analytics for Passenger Behavior- Security and Screening Improvements- In-flight Services and Entertainment- Operational Efficiency in Passenger Handling

UNIT V **AI FOR AVIATION SAFETY AND SECURITY** **9 HOURS**

Threat Detection and Anomaly Identification- Surveillance and Monitoring Systems- Cybersecurity Measures- Emergency Response and Crisis Management- Regulatory Compliance and Safety Standards- Case Studies and Applications.

TOTAL: 45 HOURS

COURSE OUTCOMES:

After the course the students are expected to be able to

CO-1: Apply AI techniques to optimize aircraft operations, maintenance, and air traffic management.

CO-2: Evaluate the impact of AI on aviation safety, security, and passenger services.

CO-3: Analyse ethical and regulatory considerations in deploying AI technologies in aviation.

CO-4: Demonstrate proficiency in AI concepts and their practical applications in aviation contexts.

CO-5: Predict and discuss future trends and innovations in AI that will shape the future of aviation

TEXT BOOKS:

1. "Artificial Intelligence in Aviation: A Decision-Making Perspective" by Andreas König and Kay Plötner-2019

2."Artificial Intelligence in Aviation and Air Traffic Control" by V. M. Rajaraman.-2020

3."Artificial Intelligence for Airplane Design" by Nicholas E. Radford-2018

REFERENCES:

1."Artificial Intelligence Applications in Aircraft Maintenance and Repair" by Dr. U. Srinivasa Raju and Dr. R. Jayaraman.-2019

2."Artificial Intelligence in Aviation: Designing Autonomous Aircraft" by Hesham El-Sayed, Alaa Khamis-2018

3."Artificial Intelligence in Aviation" edited by Max M. North-2020

WEB LINKS:

1.https://www.nasa.gov/aeronautics/

24CBAR52 **AIRCRAFT AND ENGINE SYSTEMS**

L	T	P	O	C
3	0	0	2	3

COURSE OBJECTIVES:

To impart knowledge of the aircraft systems and engine construction and its systems.

UNIT I AIRCRAFT SYSTEMS 9 HOURS

Hydraulic systems – Study of typical systems – components – Hydraulic systems controllers – Modes of operation – Pneumatic systems – Working principles – Typical Pneumatic Power system – Brake system – Components, Landing Gear Systems – Classification – Shock absorbers – Retractive mechanism.

UNIT II AIRPLANE CONTROL SYSTEMS 9 HOURS

Conventional Systems – Power assisted and fully powered flight controls – Power actuated systems – Engine control systems – Push pull rod system – operating principles – Modern control systems – Digital fly by wire systems – Auto pilot system, Active Control Technology.

UNIT III AIRCONDITIONING AND PRESSURIZING SYSTEM 9 HOURS

Basic Air Cycle systems – Vapour Cycle Systems, Boot-strap air cycle system – Evaporative vapour cycle systems – Evaporation air cycle systems – Oxygen systems – Fire extinguishing system and smoke detection system, Deicing and anti-icing system.

UNIT IV PISTON ENGINE AND GAS TURBINE ENGINE CONSTRUCTION 9 HOURS

Crank case, crank shaft, cam shafts, sumps; Accessory gearbox; Cylinder and piston assemblies; Connecting rods, inlet and exhaust manifolds; Valve mechanisms; Propeller reduction gearboxes. Constructional arrangement and operation of turbojet, turbofan, turbo shaft, turboprop. Engine Performance Gross thrust, net thrust, choked nozzle thrust, thrust distribution, resultant thrust, thrust horsepower, equivalent shaft horsepower, specific fuel consumption; Engine efficiencies; By-pass ratio and engine pressure ratio.

UNIT V PISTON ENGINE AND GAS TURBINE ENGINE SYSTEMS 9 HOURS

Piston and Jet Engines- Fuel systems – Components - Multi-engine fuel systems, lubricating systems –

Starting and Ignition systems.

TOTAL: 45 HOURS

COURSE OUTCOMES:

After the course the students are expected to be able to

CO1: Explain the principle of operation, basic design and construction of aircraft hydraulic systems

CO2: Explain the principle of operation, basic design and construction of aircraft control systems

CO3: Explain the principle of operation, basic design and construction of aircraft air conditioning systems

CO4: Explain the principle of operation, basic design and construction of aircraft piston and gas turbine engines.

CO5: Summarize the operation of a gas turbine engine systems and piston engine systems

TEXT BOOKS:

1. Mekinley, J.L. and R.D. Bent, Aircraft Power Plants, McGraw Hill 2020.
2. Pallet, E.H.J. Aircraft Instruments & Principles, Pitman & Co 2019.
3. Handbooks of Airframe and Power plant Mechanics -Powerplant handbook US dept. of Transportation, Federal, Aviation Administration, the English Book Store, New Delhi, 2019.

REFERENCES:

1. McKinley, J.L. and Bent R.D. Aircraft Maintenance & Repair, McGraw Hill, 2020.
2. Treager, S, "Aircraft Gas Turbine technology, McGraw Hill 2018.

WEB LINKS:

1. https://www.amequestionpaper.in/ame-reference-books/

24CBAR53 **AIRPORT AND AIRLINE PASSENGER MANAGEMENT**

L	T	P	O	C
4	0	0	2	4

COURSE OBJECTIVES:

To educate the students with a broad overview of the airline industry and creates awareness of the underlying factors influencing airport and airline management.

UNIT I **AIRPORT MANAGEMENT** **12 HOURS**

Introduction to airport management - Ramp Ops, Air side and Land side- Areas – Terminal Building – Apron – Runway – Taxiway – Hangar - Fire Station - Security - Fuel depot – Airport Vehicles - Airport Codes: IATA and ICAO - Various units in Airport operation.

UNIT II **AIRLINE MANAGEMENT** **12 HOURS**

Airline Management: Computer Reservations (CRS) and Departure Control Systems (DCS) functions, passenger and Baggage check-in procedures airport and off-site, Conditions of passenger and baggage carriage, boarding procedures and flight close-out messaging Managing passenger interactions, Enhanced passenger facilitation, latest innovations and career opportunities.

UNIT III **PASSENGER MANAGEMENT AT TERMINAL AND RAMP** **12 HOURS**

Reservation and Ticketing Procedures – Check in & types -Customs and Immigration formalities –Security procedure and clearance –Boarding Gate Procedure – Baggage claim and Property Irregularity Report (PIR) - Passenger service at Departure and arrival –Passenger and baggage Reconciliation - Gate no Show (GNS)- Denied Boarding and categories - Flight Cancellation, delay and Compensation Procedures

UNIT IV **PASSENGER HANDLING AND TYPES** **12 HOURS**

Types of Passengers and Handling Procedure– Handling Procedure for UM and UMNR – WCHR, WCHC, WCHS, STCR - Handling of CIP, VIP & VVIP -Reservation and Ticketing Procedures – Check in & types - Customs and Immigration formalities –INAD Procedures- Security procedure and clearance –Boarding Gate Procedure – PIR and DPR – Passenger service at Terminal - Denied Boarding and categories- Delay and AOG

UNIT V **GENERAL AND AIRCRAFT SECURITY CHECKS** **12 HOURS**

General and Aircraft security checks- Definitions, Security Policy, Responsibilities of Security - Responsibilities of Crew Members, Identification Cards, Crew Baggage Security – various phases - Airline Checks - Minimum Standards, Type A, Type B Security Check - Checklist, Searches of Aircraft Subject to Specific Threats or High Risk Flights, Discovery of a Suspect Item, Aircraft Exterior Checks, Crew Security,,

Forms : Security Search Checklist - Unruly passengers, Hijack and passenger restraining Devices, Bomb Or Sabotage Threats, Preventive Security Measures.

TOTAL: 60 HOURS

COURSE OUTCOMES:

After the course the students are expected to be able to

CO1: Analyze the administration of airport and airlines.

CO2: Illustrate the commercial operations and different strategies used in the airline.

CO3: Discuss the passenger management at landside and airside.

CO4: Explain the various types of passenger handling by airlines.

CO5: Describe about the security measures and procedures of airport and airline industry.

TEXT BOOKS:

1. IATA Ground Operations Manual.
2. Colin C. Law, Mary R. Doerflein, "Introduction to Airline Ground Service", Cengage Learning Asia;1st edition (30 September 2020).

REFERENCES:

1. Norman E. L. Shanks, Alexandre L. W. Bradley, "Handbook of Checked Baggage Screening: Advanced Airport Security Operation", Willey Publication, 2019.
2. Dr. Sumeet Suseelan, "Airline Airport & Tourism management: Aviation Manual", Notion Press; 1st edition (14 August 2019).
3. Edissa Uwayo, "Airline and Airport Operations", Notion Press; 1st edition (23 September 2021).

WEB LINKS:

1. https://www.iata.org/en/training/courses/flight-operations-management/talp03/en/
2. https://www.iare.ac.in/sites/default/files/lecture_notes/IARE_APO_LECTURE_NOTES_0.pdf
3. https://www.slideshare.net/Padrino80/airport-management-11

24PBARV51 **PRACTICAL IX- TECHNICAL SEMINAR**

L	T	P	O	C
0	0	2	2	1

COURSE OBJECTIVES:

The objective of the seminar is to impart training to the students in collecting materials on a specific topic from books, journals and other sources, compressing and organizing them in a logical sequence, and presenting the matter effectively both orally and as a technical report. The use of slides/transparencies and overhead/slide/multimedia projector is also introduced to the user during the seminar

Guidelines for preparing Seminar:

1. Selection of topic/area in Aeronautical Science Subjects.
2. Approval to the selected topic from the concerned faculty in charge.
3. Study of topic: Students are requested to acquire a thorough knowledge on the subject by referring back papers and reference books (These may be included as references at the end of the paper) on the corresponding area.
4. Preparation of slides for presentation Slides may be presented in MS power point. Time allowed for presentation is 20 minutes for presentation and 5 minutes for discussions. So, number of slides may be around 20 - 25 to adhere the time limit.
5. Organization of slides
   - The first slide will be a title page showing the title, name of author (presenter), roll no. and Class.
   - 2nd page will contain overview of the seminar.
   - Successive pages will contain
   - Objectives of the paper

   1) Introduction
   2) Body of the paper includes system dynamics, methodology, graphs, block diagrams etc. arranged in a logical sequence depending on the problem.
   3) Results and discussions
   4) Conclusion

6. Each slide will have a title and each figure have a caption.
7. Draft copy of the Seminar report should also be submitted before the presentation.

24PBAR52 **AIRCRAFT SIMULATOR LAB**

L	T	P	O	C
0	0	2	2	1

COURSE OBJECTIVES:

To understand how aircraft fly, how the trainee reacts to applications of flight controls, the effects of aircraft systems, and how the aircraft reacts to external factors such as air density, turbulence, wind-shear, cloud, precipitation, etc. with the help of Flight simulation

Exp. no.	EXPERIMENTS	Number of Hours
1	Instrument Identification	5
2	Starting Procedures	5
3	Taxing	5
4	Take-Off	5
5	Landing	5
6	Understanding the synthetic procedures	5
		TOTAL HOURS=30

COURSE OUTCOMES

On completion of the course students will be able to

CO1: Explain the correct starting procedure.

CO2: List the hazards possible when correct starting procedure is not followed.

CO3: Illustrate the essential instrument in cockpit.

CO4: Differentiate between synthetic flying and actual flying.

CO5: Perform take offs and Landings.

REFERENCES

1. Garmin Manuals (Garmin Website)
2. GIFD_Pilot _Training_Guide_Students soft copy
3. GIFD_Trainer_User_Guide soft copy
4. POH – Diamond DA42
5. Practical Flying Training Videos

WEB LINKS

1. https://www.youtube.com/watch?v=Nl8fw6N_Uyo

2. https://www.youtube.com/watch?v=9DM_8OW9Z3E
3. https://www.youtube.com/watch?v=YzNSBTxH_Cs
4. https://www.youtube.com/watch?v=UvKeDcga9zo
5. https://www.youtube.com/watch?v=5Miei8UHiYg

24DVAC51 **ENTERPRENEURIAL DEVELOPMENT**

L	T	P	O	C
2	0	0	1	2

COURSE OBJECTIVES:

To enrich the students towards the knowledge of entrepreneurial skills and to make the students understand the approaches to attain the goals of the business.

UNIT I **INTRODUCTION TO ENTREPRENEURSHIP** **6 HOURS**

Introduction, Concept of Entrepreneur, Entrepreneurship and Enterprise, Definition of Entrepreneurship, Objectives of Entrepreneurship Development, Phases of Entrepreneurship Development, Role of Entrepreneurship, The Entrepreneurial Mindset, Characteristics of Entrepreneurship, Traits of Entrepreneurship, Introduction to Entrepreneurship Skills

UNIT II **ENTREPRENEURSHIP DEVELOPMENT SKILLS** **6 HOURS**

Meaning of Entrepreneurship skill, Types of Entrepreneurship Skills: Business management skills, Teamwork and leadership skills, Communication and listening, Customer service skills, Financial skills, Analytical and problem-solving skills, Critical thinking skills, Strategic thinking and planning skills, Technical skills, Time management and organizational skills, Branding, marketing and networking skills, How to improve entrepreneurial skills, Entrepreneurial skills in the workplace.

UNIT III **TYPES OF ENTREPRENEURS** **6 HOURS**

Classification and Types of Entrepreneurs; Women Entrepreneurs; Social Entrepreneurship; Corporate Entrepreneurs, Family Business: Concept, structure, and kinds of family firms; Culture and evolution of family firm; Managing Business.

UNIT IV **ENTREPRENEUR PROJECT DEVELOPMENT & BUSINESS PLAN** **6 HOURS**

Generation of Ideas-Innovation, Invention, Creativity, Business Idea and change. Idea generation. Kinds of Business Analysis-Concept of Environmental scanning and SWOT analysis. Business Planning Process-The business plan as an Entrepreneurial tool, scope and value of Business plan. Fundamental Elements of Business-Plan, Objectives, Market and Feasibility Analysis, Marketing, Finance, Organisation & Management and Ownership.

UNIT V **MOBILIZING RESOURCES** **6 HOURS**

Resource Mobilization for entrepreneurship: Resources mobilization, types of resources, Process of resource mobilization, Arrangement of funds; writing a Funding Proposal, Traditional sources of financing, Venture capital, Angel investors, Business Incubators

TOTAL: 30 HOURS

COURSE OUTCOMES:

After the course the students are expected to be able to

CO1 T o Understand the concept of Entrepreneurship

CO2 To Identify, create and analyze entrepreneurial opportunities.

CO3 To Assess techno economic feasibility of a Business Plan

CO4 To Create Business Plans

CO5 To State various statutory institutions involved in the process of Entrepreneurship development

TEXT BOOKS:

1. Madhurima Lall and Sultan Ahmad (2021). Fundamentals of Entrepreneurship and Project Planning. S. Chand & Sons.
2. Bhatia. RC (2020). Entrepreneurship: Business and Management. S. Chand & Sons.
3. Nitin Zaware, Shilpa R Kankonkar and Yogesh S. Daudkhane (2019), Entrepreneurship Development. Thakur Publications Pvt. Ltd.

WEBLINKS:

1. https://openpress.usask.ca/entrepreneurshipandinnovationtoolkit/chapter/chapter-1-introduction-to-entrepreneurship/
2. https://articles.bplans.com/10-great-websites-for-entrepreneurs/
3. https://www.entrepreneur.com/article/272185

24DVAC51 **DRONE OPERATIONS AND SAFETY MANAGEMENT**

L	T	P	O	C
2	0	0	1	2

COURSE OBJECTIVES:

To equip students with practical knowledge and technical skills in drone operations, safety protocols, and regulatory compliance, preparing them for opportunities in the growing unmanned aerial vehicle (UAV) industry.

UNIT I **INTRODUCTION TO DRONES AND UAV TECHNOLOGY** **6 HOURS**

- Types and classifications of drones
- Components and mechanics of UAVs
- Applications of drones in aviation, logistics, agriculture, and surveillance

UNIT II **DRONE OPERATIONS** **6 HOURS**

- Pre-flight checks and maintenance
- Flight planning and navigation
- Real-time drone control and data capture
- Post-flight procedures

UNIT III **SAFETY PROTOCOLS AND RISK MANAGEMENT** **6 HOURS**

- Identifying and mitigating operational risks
- Emergency response during drone operations
- Environmental considerations (e.g., flying in adverse conditions)

UNIT IV **REGULATORY COMPLIANCE AND CERTIFICATION** **6 HOURS**

- International and regional drone operation guidelines (FAA, DGCA, etc.)
- Restricted zones and no-fly areas
- Steps for obtaining drone pilot certification

UNIT V **DATA ANALYSIS AND EMERGING TRENDS** **6 HOURS**

- Basics of aerial data capture (photography, videography, and sensors)
- Processing drone-collected data using GIS and mapping tools
- Introduction to AI and machine learning applications in UAVs
- Emerging trends: swarm drones, delivery drones, and advanced automation.

TOTAL: 30 HOURS

COURSE OUTCOMES:

After the course the students are expected to be able to

1. Understand technical, operational, and safety aspects of drones.
2. Perform advanced data collection and analysis using drones.
3. Stay updated with emerging technologies and trends in UAVs.
4. Explore innovative solutions for real-world challenges using drones.

TEXT BOOKS:

1. **"Introduction to UAV Systems" by Paul Fahlstrom and Thomas Gleason** : Wiley -2019

REFERENCES:

4. "Small Unmanned Aircraft: Theory and Practice" by Randy Beard and Timothy McLain, Princeton University Press-2018
5. "Drone FAA Part 107 Study Guide" by T.M. Dankovich", Independently Published -2020
6. "The Drone Pilot's Handbook: Expanded and Updated Edition" by Adam Juniper", Wellfleet publishers-2020

24IBAR51 **INTERNSHIP-II**

L	T	P	O	C
0	0	2	1	1

COURSE OBJECTIVES:

- The goal of student internship program is to have the professional training and growth in various organizations and all types of Aviation companies.

Purpose

The purpose of the student internship program is to provide students with an opportunity to gain workplace skills and learn more about corporate field. This is also an opportunity to contribute to the local community by reaching out to future professionals.

Parties Involved

The student internship program involves two parties:

1. The Intern Supervisor (The Company)
2. The Intern (The Student)

Category	Requirements
Status Group	Group Internship Maximum of 5 person for one company.
Length	Period of one month
Hours	Hours will be agreed upon between the intern and the Intern Supervisor.
Reports To	The Intern Supervisor
Required Meetings	1. Attend Orientation 2. Attend meetings as requested by the Intern Supervisor.
Duties	1. Perform all duties as assigned by the Intern Supervisor 2. If performing the internship for school credit, the intern will be responsible for providing and submitting the required forms to the Intern Supervisor.

Evaluation process for Internship Reporting:

Internal Marks for Internship Report	40 marks
External Marks for Internship Report	60 marks

Certification	Content	Presentation
20 marks	**20 marks**	**20 marks**

COURSE OUTCOME:

CO1: To Contribute to organizations of all types and sizes by managing critical internship.

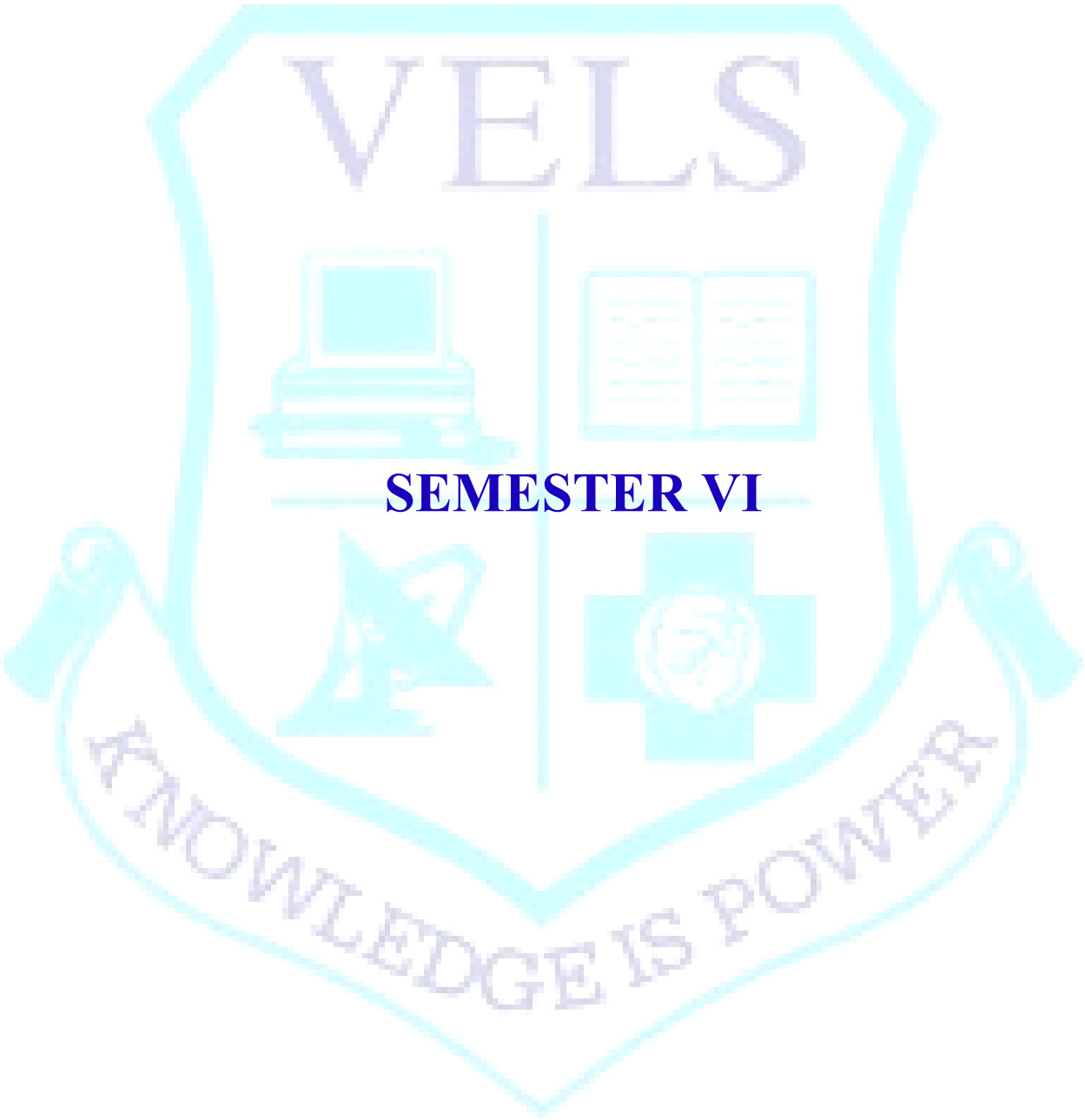
CO2: To provide creative solutions to key challenges.

CO3: To design marketing strategies.

CO4: To Provide a variety of ways to engage in experiential Learning

CO5: To lay the foundation for strong relationship and subsequent job offers

CO6: To apply the Knowledge and skills acquired in the classroom to a professional context



SEMESTER VI

24CBAR61 **CIVIL AVIATION REQUIREMENTS**

L	T	P	O	C
3	0	0	2	3

COURSE OBJECTIVES:

The air law course aims to enable the students to understand Civil Aviation Administrations, Civil Aviation Authorities, Airports and Air Navigation Service Providers to support their organization in compliance with national and international air law, through application of appropriate knowledge and advocacy.

UNIT I **REGULATORY FRAMEWORK, CAR-66 CERTIFYING STAFF-MAINTENANCE ENGINEERS** **9 HOURS**

Role of International Civil Aviation Organization; The Aircraft Act and Rules made there under Role of the DGCA; Relationship between CAR-21, CAR-M, CAR-145, CAR-66, CAR 147 The Aircraft Rules (Applicable to Aircraft Maintenance and Release) Aeronautical Information Circulars (Applicable to Aircraft Maintenance and Release), CAR Sections 1 and 2, Detailed understanding of CAR-66.

UNIT II **AIRCRAFT OPERATIONS AND CAR-145 – APPROVED MAINTENANCE ORGANIZATIONS** **9 HOURS**

Commercial Air Transport/Commercial Operations, Air Operators Certificates; Operators Responsibilities, in particular regarding continuing airworthiness and maintenance; Documents to be carried on board; Aircraft Placarding (Markings), Detailed understanding of CAR-145 and CAR M Subpart F.

UNIT III **CAR 21 – AIRCRAFT CERTIFICATION** **9 HOURS**

General Certification rules: such as FAA & EACS 23/25/27/29; Type Certification; Supplemental Type Certification; CAR-21 Design/Production Organization Approvals. Aircraft Modifications and repairs approval and certification Permit to fly requirements, Documents - Certificate of Airworthiness; Certificate of Registration; Noise Certificate; Weight Schedule; Radio Station License and Approval.

UNIT IV **CAR M CONTINUING AIRWORTHINESS** **9 HOURS**

Detail understanding of CAR M provisions related to Continuing Airworthiness. Detailed understanding of CAR-M Maintenance Program, Maintenance checks and inspections; Master Minimum Equipment Lists, Minimum Equipment List, Dispatch Deviation Lists; Airworthiness Directives; Service Bulletins, manufacturers service information; Modifications and repairs; Maintenance documentation: maintenance manuals, structural repair manual, illustrated parts catalogue, etc.; Continuing airworthiness; Test flights; ETOPS /EDTO, maintenance and dispatch requirements; RVSM, maintenance and dispatch requirements RNP, MNPS Operations All Weather Operations, Category 2/3

operations and minimum equipment requirements.

UNIT V SAFETY MANAGEMENT SYSTEM, FUEL TANK SAFETY 9 HOURS

State Safety Program, Basic Safety Concepts, Hazards & Safety Risks, SMS Operation, SMS Safety performance, Safety Assurance, Special Federal Aviation Regulations (SFARs) from 14 CFR SFAR 88 of the FAA and of JAA TGL 47, Concept of CDCCL, Airworthiness Limitations Items (ALI).

TOTAL: 45 HOURS

COURSE OUTCOMES:

Upon completion of the course, participants will be able to

CO1: Analyze about CAR-66 certifying staff – maintenance.

CO2: Examine about aircraft operations and CAR-145 - Approved Maintenance Organizations.

CO3: Explain about aircraft certification.

CO4: Explain about continuing airworthiness- CAR M

CO5: Describe about safety management system and fuel tank safety

TEXT BOOKS:

1. DGCA Circulars for latest CAR updates.
2. Michael Ferguson, Sean Nelson, “Aviation Safety: A Balanced Industry Approach”, Delmar Cengage Learning; New edition (11 January 2024).
3. Stephen K Cusick, Antonio I Cortes and Clarence Rodrigues, “Commercial Aviation Safety”, McGraw Hill Education, 6th edition, 2020.

REFERENCES:

1. Alan J. Stolzer, “Safety management systems in aviation”, Ashgate Publishing, Ltd., 2020.
2. Shari Stamford Krause, “Aircraft Safety: Accident Investigations, Analyses, & Applications”, McGraw- Hill Education, 13-Aug-2020.

WEB LINKS:

1. https://www.amequestionpaper.in/ame-reference-books/

24CBAR62 **FLIGHT PLANNING AND MONITORING**

L	T	P	O	C
4	0	0	2	4

COURSE OBJECTIVES:

To produce an optimal, efficient and safe flight plan to describe a proposed aircraft flight. It involves planning, generating (implementing), briefing, monitoring and document retention.

UNIT I **INTRODUCTION TO FLIGHT DISPATCH** **12 HOURS**

Abbreviations and definitions pertaining to Flight Dispatch, insights of flight operation, need for qualified (by state regulator) dispatcher, Flight dispatcher approval – DGCA process & foreign license, validity of approval – period & acceptance in other countries.

UNIT II **DECODING AND UNDERSTANDING** **12 HOURS**

Notam, Snowtam, Volcanic Ash Advisory, Metar / Speci, Taf, Enroute Wx Chart, Sat Picture / Doppler Wx Radar, Plotting Of Danger/Restricted Zone, Build Dct Route, Mel / Cdl, Understanding Airac Cycle And Updates, Understanding Aip, Amendment and supplement

UNIT III **OPERATIONAL FLIGHT PLAN OR COMPUTERISED FLIGHT PLAN** **12 HOURS**

Need for Operational flight plan, Various parameters considered in planning – Route planning, re-routing and optimization – Cost Index, fuel policy, fuel calculation, CP, PNR, fuel tankering, company advisory and Dispatch advisory for additional fuel uplift, Re-dispatch concept, flight following

UNIT IV **PERFORMANCE PLANNING** **12 HOURS**

Definitions - types of weight, weight limitations and TOW calculation - weight and balance - take-off performance, factors affecting - landing performance, configuration - enroute performance, profile, fuel penalties.

UNIT V **DEVIATION FROM NORMAL OPERATION INCLUDING BCP** **12 HOURS**

Different scenario's, handling and reporting procedure, maintain check list, need for revised operational flight plan, contingency flight plan or Historic Flight Plan (HFP), low visibility operation, challenges in Aviation Safety, Alcohol or Psychoactive Substances

TOTAL: 60 HOURS

COURSE OUTCOMES:

After the course the students are expected to be able to

CO-1: Gain knowledge about flight dispatch and its regulatory insights and its necessity

CO-2: Understanding of various technical terminologies and knowledge to decode

CO-3: Gain knowledge on procedures and practices implemented in generating flight plan and performance limitations

CO-4: Gain knowledge on insights of Flight Dispatch manual and other related flight Operational activities

CO-5: Gain knowledge on non-normal operations affecting regular operations and Business Continuity Plan

TEXT BOOKS:

1. Massoud Bazargan, "Airline Operations and Scheduling", Routledge, 2nd Edition, 28 August,2020.
2. Aeronautical Information Publication - AIP Peter J. Bruce, "Understanding Decision-making Processes in Airline Operations Control", Routledge; 1st edition (September 8, 2016).

REFERENCES:

1. JAA ATPL Theoretical Training Manual: Flight Performance and Planning, Transair (UK) Ltd; 7th Revised edition (1 June 2020).
2. David Cockburn, "Flight Performance and Planning", Air Pilot Publisher Ltd (1 January 2021).
3. Aircraft Dispatcher: Book of Knowledge (Aviation) - Patrick s. Flannery - Createspace Independent Pub (20 July 2019).

WEB LINKS:

1. https://ocw.mit.edu/courses/aeronautics-and-astronautics/16-687-private-pilot-ground-school januaryiap- 2019/class-videos/lecture-15-flight-planning/

24CBAR63 **AIRCRAFT LOADS AND CONTROL**

L	T	P	O	C
4	0	0	2	4

COURSE OBJECTIVES:

On successful completion of this course, the students can able to prepare, calculate and finalize the weight and balance document.

UNIT I **LOAD AND CONTROL** **12 HOURS**

Introduction, Load Terminologies, Load Control, Effects of Weight, Weight Changes, Centre of Gravity, Centre of Gravity Limits, Center of Pressure, Mass and Balance Theory, Aircraft Datum, Arms & Moment, The Law of the Lever, Stability and Balance Control, Importance of Weight and Balance, General Description of Aircraft.

UNIT II **CENTRE OF GRAVITY** **12 HOURS**

Empty Weight Centre of Gravity, Mass & Volume Conversion, Determining the Centre of Gravity, Shifting the Centre of Gravity, Basic Weight and Balance Equation, Weight and Balance Documentation, Mean Aerodynamic Chord, Expression in Percentage of Mean Aerodynamic Chord.

UNIT III **AIRCRAFT WEIGHING** **12 HOURS**

Introduction, Requirements, Equipment for Weighing, Preparation for Weighing, Safety Precautions, Preparation & Approval of Weight Schedule, Jacking and Leveling of Aircraft, Aircraft Weighing Procedure, Weight and Balance Calculation, Aircraft Weight and Balance Report.

UNIT IV **AIRCRAFT LOADING** **12 HOURS**

Principles, Regulatory Requirements, Load Planning, Aircraft Loading, Notification to the Captain, Loading Procedures, Instructions for Safe Loading, Standard Weight of Flight Crew, Passenger and Baggage, Fuel Loading and Distribution, Departure Control System.

UNIT V **LOAD AND TRIM** **12 HOURS**

Description, Load and Trim Sheet, Importance of Load & Trim Sheets, Regulatory Requirements, Manual Load Sheets, Procedure for Preparing Load & Trim Sheet, Acceptance of Load and Trim Sheets, Provisional Load Sheets, Features of Load & Trim Sheet, Adjustment of the Last Minute Changes, Qualifications, Duties & Responsibilities of Load &Trim Officer.

TOTAL: 60 HOURS

COURSE OUTCOMES:

After the course the students are expected to be able to

CO-1: Understand the fundamental concepts of Aircraft Load and Control.

CO-2: Calculate the Centre of Gravity and Mean Aerodynamic Chord.

CO-3: Understand the procedure of Aircraft Weighing.

CO-4: Understand the principles and concepts of Aircraft Loading.

CO-5: Prepare the Aircraft Load and Trim Sheet.

TEXT BOOKS:

1. U. S. Department of Transportation, Federal Aviation Administration, "Aircraft Weight and Balance Handbook" FAA-H-8083-1A and 1B. -2019
2. IATA Ground Operations Manual (IGOM), Supplement to Airport Handling Manual, 4th Edition.-2020
3. Oxford Aviation Academy ATPL Book "Mass and Balance - Performance".-2018

REFERENCES:

1. Nordian, "Mass & Balance: Flight Performance & Planning", streling book house, 2018.
2. Jeppesen, "EASA ATPL Training Mass & Balance", Jeppesen Gmph, 2019.

WEB LINKS:

5. https://www.milesaviation.com/blog/aircraftdeicingfluidtypes-t5f4r
6. https://www.aisats.in/storage/file/WVU8QRT6FwteCglhIDF9ryICzDOGMaSvUmtH6685.pdf

24CBAR64

AIRCRAFT STRUCTURES AND COMPOSITE MATERIALS

L	T	P	O	C
4	0	0	2	4

COURSE OBJECTIVES:

- To understand the basics knowledge in stress and strains, familiarize in the materials properties
- To gain knowledge in analysis of aircraft structures and airframe loads.
- To study and have a clear idea about the sheet metal and inspection of components.

UNIT I BASICS OF STRENGTH OF MATERIALS 12 HOURS

Basic concepts; stress, strain, Hooke's law, types of stresses and strains, Poisson's ratio. Elastic constants- Young's modulus, Rigidity modulus & Bulk modulus. Material properties: toughness, hardness, brittleness, elasticity& plasticity- ductile & brittle materials. stress- strain curve, tensile properties- yield strength, allowable strength and factor of safety.

UNIT II BASICS OF ENGINEERING MECHANICS 12 HOURS.

Concurrent and non-con-current forces, Free body diagram, Support reactions, Types of beams, Types of supports, statically determinate structures, Indeterminate structures, moment of inertia, moment of inertia of different sections.

UNIT III ANALYSIS OF AIRCRAFT STRUCTURES 12 HOURS

Principles of stressed skin structures constructions-Materials Such as Aluminum alloys, Steel, Titanium, Plastics, Glass Composites. Structural components of Aircraft- Loads on structural components, functions of structural components and fabrication of structural components.

UNIT IV AIRWORTHINESS AND AIRFRAME LOADS 12 HOURS

Airworthiness- Factors of safety flight envelopes, loads factor determination. Airframe loads-Aircraft inertia loads, symmetric maneuvers load, normal accelerations associated with various types of maneuvers and Gust envelope. Fatigue- safe life, fail safe structures, fatigue strength of components, Prediction of aircraft fatigue life, crack propagation.

UNIT V COMPOSITE MATERIALS IN AVIATION 12 HOURS

Introduction to Composite Materials, Properties and applications of Composite Materials, Types of Composite Materials Used in Aviation, Micromechanics, Macromechanics, Laminates, Manufacturing Process. Maintenance and Repair of Composites

TOTAL -60 HOURS

COURSE OUTCOMES:

After the course the students are expected to be able to

CO-1: Explain the basics concepts of strength of materials

CO-2: Explain the basics mechanics defining the aircraft structures.

CO-3: Explain the structural loads on aircraft.

CO-4: Explain the Airworthiness of Aircraft structures.

CO-5: Examine the sheet metal and do the inspection of aircraft components.

TEXT BOOKS:

1. . H. G. Megson, "Aircraft structures for engineering students", Butterworth Heinemann, 2nd Edition, 2021.

REFERENCE BOOKS:

1. R.K.Bansal "Strength of materials", Skybrary Publishing, 1st Edition, 2021.
2. Aircraft structure Ch. 01 (FAA)
3. AC 43.13-1B - Acceptable Methods, Techniques, and Practices - Aircraft Inspection and
4. Repair, IATA, Module 14, 2021

4. EASA-part-66-module-13, Aircraft tech book co, 1st Edition, 2019..

WEB LINKS:

1. https://www.iata.org/en/training/courses/airline-industry-introduction/talg50hlm/en/.

24PBAR61 **PRACTICAL X- FLIGHT PLANNING LAB**

L	T	P	O	C
0	0	2	2	1

COURSE OBJECTIVES:

Flight planning aims to produce a flight plan to describe a proposed aircraft flight.

Exp no	EXPERIMENTS	Number of Hours
1	Understanding, Coordination with different agencies.	5
2	Study of NOTAM	5
3	Weather obtaining procedures.	5
4	Filling of Flight Plan	5
5	Obtaining FIC and ADC	5
6	ATIS	5

TOTAL: 30 HOURS

COURSE OUTCOMES:

On completion of the course students will be able to

CO1: Communicate with different agencies involved in flight Planning

CO2: Fill flight plan form as per ICAO prescribed procedure.

CO3: Explain the procedure & necessity of obtaining FIC & ADC

CO4: Interpret NOTAMS and understand its importance for a flight operation

CO5: Describe the procedure to obtain departure, Enroute and destination weather report and forecast.

REFERENCES:

1. D.P.Raymer," Aircraft conceptual design", AIAA Series, 2019.

24RBAR61 **MINI PROJECT**

L	T	P	O	C
0	0	4	1	2

COURSE OBJECTIVES:

The mini project is designed to help students to develop practical ability and knowledge with the practical tools/techniques for solving real life problems related to the industry, academic institutions and research centers. The course Mini Project is one that involves practical work for understanding and solving problems in the field of Aviation.

Instructions for preparation of Mini-Project Reports

The Mini-Project should be written in standard scientific paper format. **Title page:** Authors name, Supervisors Name and Designation **Abstract:** 250 words = 1 page.

Introduction: ~500-750 words = 2-3 pages **Materials and Methods**: ~1500 words = 6 pages **Results:** ~1500 words = 6 pages

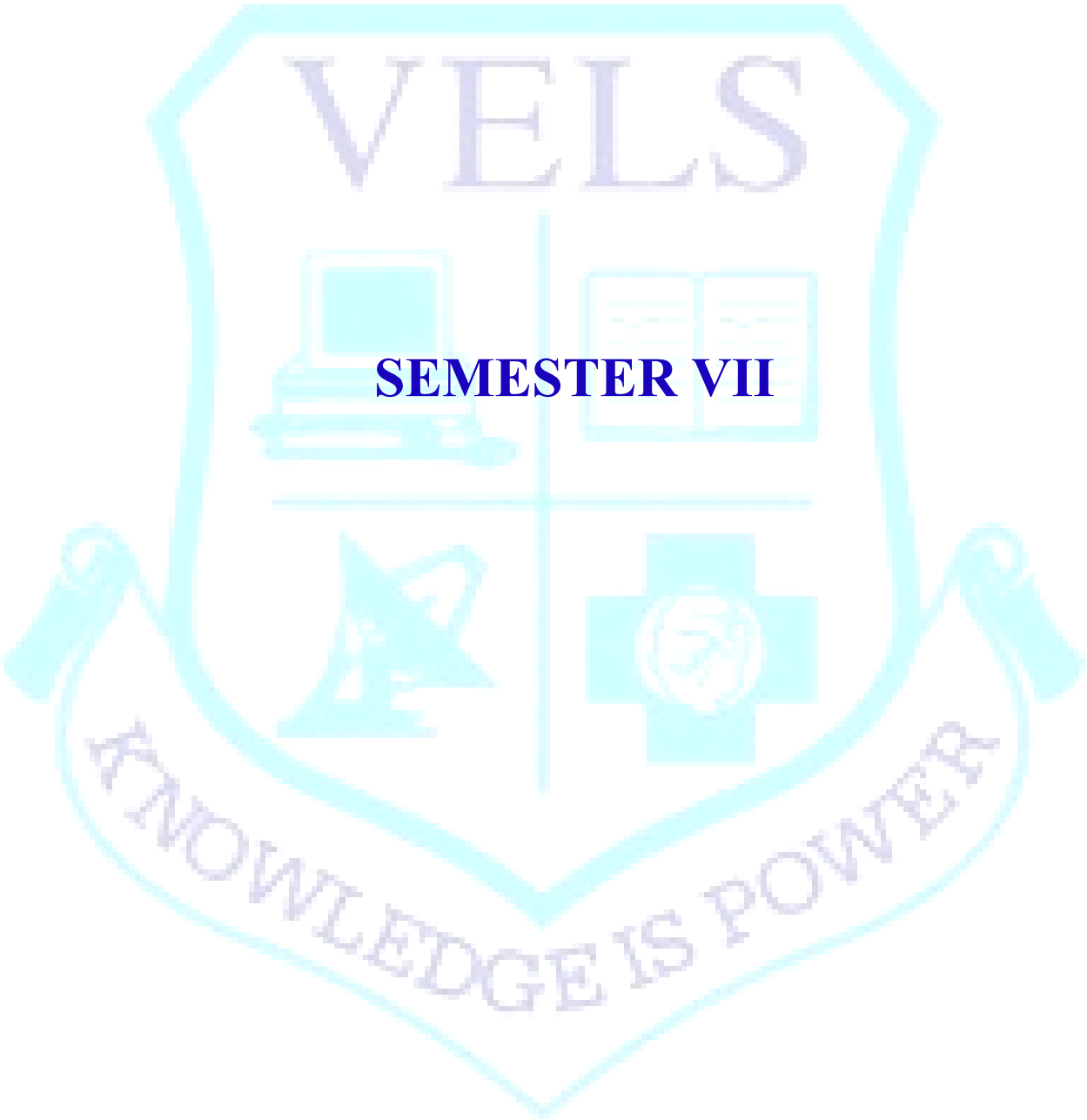
This should provide a concise account of the results obtained, in a logical order that hopefully tells a story. This will not necessarily be the order in which you carried out the experiments! Make maximum use of figures / tables - remember a picture often replaces a thousand words. A standard scientific paper in most journals will contain ~6 (maximum 8) figures or tables.

Discussion :1500 words = 6 pages

This is valuable inclusion in a project report where the student may not have sufficient time to complete the work and it contains constant ideas of further work.

Reference :1250words = 5 pages

Standard format should be followed and include all the details, Including the full reference in the list maximum of 30 reference is adequate



SEMESTER VII

24CBAR71 **AIRCRAFT DESIGN**

L	T	P	O	C
3	0	0	2	3

COURSE OBJECTIVES:

Student undergoing this course are expected to describe the fundamental concepts of aircraft design and the factors affecting aircraft performance.

UNIT I TYPES OF AIRCRAFT DESIGN LAYOUTS 9 HOURS

Review of developments in aviation categories and types of aircraft specifications-various configurations-layouts and their relative merits-strength, stiffness, fail safe and fatigue requirements maneuvering load factors-gust and maneuverability envelopes-balancing and maneuvering loads on tail planes.

UNIT II POWER PLANT TYPES AND CHARACTERISTICS 9 HOURS

Characteristics of different types of power plants-propeller characteristics and selection-relative merits of location of power plant.

UNIT III PRELIMINARY DESIGN 9 HOURS

Preliminary design selection of geometric and aerodynamic parameters-weight estimation and balance diagram- drag estimation of complete aircraft-level flight, Climb, Take- Off and landing calculations- range and endurance- static and dynamic stability estimates-control requirements.

UNIT IV OPTIMIZATION 9 HOURS

Special problems layout peculiarities of subsonic and supersonic aircraft-optimization-of wing loading to achieve desired performance-loads on undercarriages and design requirements.

UNIT V STRUCTURAL DESIGN 9 HOURS

Estimation of loads on complete aircraft and components-structural design of fuselage, wings and undercarriages, control, connections and joints. materials for modern aircraft-methods of analysis, testing and fabrication.

TOTAL: 45 HOURS

COURSE OUTCOMES:

The students should be able to understand

CO1: Describe the types of aircraft specifications

CO2: Discuss the powerplant type and characteristics

CO3: Examine preliminary design

CO4: Examine special problems

CO5: Design conceptual aircraft

TEXT BOOKS:

1. G. Corning, "Supersonic & Subsonic Airplane Design", 6th Edition, Edwards Brothers Inc.,Michigan, 2021
2. H.E.F.Bruhn, "Analysis and Design of Flight Vehicle Structures", Tristate Offset Co.,U.S.A., 5th Edition, 2022
3. A.A. Lebedenski, "Notes on airplane design'', Part-I, I.I.Sc., Bangalore, 2021

REFERENCES:

1. E. Torenbeek, "Synthesis of Subsonic Airplane Design", Delft University Press, 2nd Edition, London, 2019.
2. D.P.Raymer," Aircraft conceptual design", AIAA Series, 2021.
3. H.N.Kota, "Integrated design approach to Design fly by wire" Lecture Notes Interline Pub,2nd Edition, .Bangalore, 2020.
4. S.c.Keshu & k.k.Ganapathi "Aircraft Production Techniques and Management", Snippet Books, 2nd Edition, 2021.

WEB LINKS:

1. http://www.aircraftdesign.com/
2. https://en.wikipedia.org/wiki/Aircraft_design_process
3. https://www.researchgate.net/publication/326798586_Aircraft_Design_A_Conceptual_Approach_Sixth_Edition
4. https://nptel.ac.in/courses/101/106/101106035/

24CBAR72 **AVIATION LEGISLATION**

L	T	P	O	C
4	0	0	2	4

COURSE OBJECTIVES:

The air regulation course aims to enable the students to understand Civil Aviation Administrations, Civil Aviation Authorities, Airports and Air Navigation Service Providers to support their organization in compliance with national and international air law, through application of appropriate knowledge and advocacy.

UNIT I **REGULATORY FRAMEWORK, CAR-66 CERTIFYING STAFF – MAINTENANCE** **12 HOURS**

Role of International Civil Aviation Organization; The Aircraft Act and Rules made there under Role of the DGCA; Relationship between CAR-21, CAR-M, CAR-145, CAR-66, CAR 147 The Aircraft Rules (Applicable to Aircraft Maintenance and Release) Aeronautical Information Circulars (Applicable to Aircraft Maintenance and Release), CAR Sections 1 and 2, Detailed understanding of CAR-66.

UNIT II **DIGITAL AVIONICS ARCHITECTURE** **12 HOURS**

Commercial Air Transport/Commercial Operations, Air Operators Certificates; Operators Responsibilities, in particular regarding continuing airworthiness and maintenance; Documents to be carried on board; Aircraft Placarding (Markings), Detailed understanding of CAR-145 and CAR M Subpart F.

UNIT III **FLIGHT DECKS AND COCKPITS** **12 HOURS**

General Certification rules: such as FAA & EACS 23/25/27/29; Type Certification; Supplemental Type Certification; CAR-21 Design/Production Organization Approvals. Aircraft Modifications and repairs approval and certification Permit to fly requirements, Documents - Certificate of Airworthiness; Certificate of Registration; Noise Certificate; Weight Schedule; Radio Station License and Approval. Detail understanding of CAR M provisions related to Continuing Airworthiness. Detailed understanding of CAR-M.

UNIT IV **NATIONAL AND INTERNATIONAL REQUIREMENTS** **12 HOURS**

Maintenance Programme, Maintenance checks and inspections; Master Minimum Equipment Lists, Minimum Equipment List, Dispatch Deviation Lists; Airworthiness Directives; Service Bulletins, manufacturers service information; Modifications and repairs; Maintenance documentation: maintenance manuals, structural repair manual, illustrated parts catalogue, etc.; Continuing airworthiness; Test flights; ETOPS /EDTO, maintenance and dispatch requirements; RVSM, maintenance and dispatch requirements RNP, MNPS Operations All Weather Operations, Category 2/3 operations and minimum equipment requirements

UNIT V SAFETY MANAGEMENT SYSTEM, FUEL TANK SAFETY 12 HOURS

State Safety Programme, Basic Safety Concepts, Hazards & Safety Risks, SMS Operation, SMS Safety performance, Safety Assurance, Special Federal Aviation Regulations (SFARs) from 14 CFR SFAR 88 of the FAA and of JAA TGL 47, Concept of CDCCL, Airworthiness Limitations Items (ALI).

TOTAL: 60 HOURS

COURSE OUTCOMES:

Upon completion of the course, participants will be able to accomplish the following:

CO1: Explain the concepts and rules of international air law;

CO2: Analyze the relevance of the rules and procedures of international air law for their own role and functions in their organization; and

CO3: Apply their knowledge and understanding to assist their national administration in improving implementation.

CO4: Illustrated parts catalogue.

CO5: List the airworthiness limitations items (ALI)

TEXT BOOKS:

1. The Aircraft Act, 1934
2. The Aircraft Rules, 1937 VOL 1
3. The Aircraft Rules, 1937 VOL 3
4. ICAO Annex – 8 to the convention on international civil aviation
5. International standards and recommended practices

REFERENCES:

1. Airlaw Airworthiness (DGCA)
2. Aeronautical Information Circular
3. CAR - Section - 1, 2, & 8 SMS4. CAR - 21, M, 145, 66& 147
4. Special Federal Aviation Regulations (SFARs) - 14 CFR, SFAR 88 & JAA TGL 47

WEB LINKS:

1. https://en.wikipedia.org/wiki/Aviation_law#:~:text=Aviation%20law%20is%20the%20branch
2. %20of%20law%20that, law%20due%20to%20the%20nature%20of%20air%20travel.
3. https://youtu.be/vtsR1Jdwse4
4. https://iclg.com/practice-areas/aviation-laws-and-regulations/usa

24CBAR73 AIRCRAFT MAINTENANCE PRACTICES

L	T	P	O	C
4	0	0	2	4

COURSE OBJECTIVES:

The objective of this course is to enable students to demonstrate competence in working effectively and safely in an aircraft maintenance organization. The course includes an introduction to Safety Precautions for aircraft and workshops; basic understanding of First Aid at work; the safe use, care and control of tools; standards of workmanship; use of workshop materials, lubrication equipment and methods; precision measuring tools.

UNIT I SAFETY PRECAUTIONS-AIRCRAFT & WORKSHOP, WORKSHOP PRACTICES, TOOLS 12 HOURS

Aspects of safe working practices including precautions to take when working with electricity, gases especially oxygen, oils and chemicals; Instructions on the remedial action to be taken in the event of a fire or another accident with one or more of these hazards including knowledge on extinguishing agents. Care of tools, control of tools, use of workshop materials; Dimensions, allowances and tolerances, standards of workmanship; Calibration of tools and equipment, calibration standards. Common hand tool types; Common power tool types; Operation and use of precision measuring tools; Lubrication equipment and methods. Operation, function and use of electrical general test equipment

UNIT II ENGINEERING DRAWINGS, DIAGRAMS AND STANDARDS, TYPES OF CORROSION 12 HOURS

Drawing types and diagrams, their symbols, dimensions, tolerances and projections; Identifying title block information; Microfilm, microfiche and computerized presentations; Specification 100 of the Air Transport Association (ATA) of America; Aeronautical and other applicable standards including ISO, AN, MS, NAS and MIL; Wiring diagrams and schematic diagrams. Drill sizes for bolt holes, classes of fits; Common system of fits and clearances; Schedule of fits and clearances for aircraft and engines; Limits for bow, twist and wear; Standard methods for checking shafts, bearings and other parts. Chemical fundamentals; Formation by, galvanic action process, microbiological stress. Types of corrosion and their identification; Causes of corrosion; Material types, susceptibility to corrosion.

UNIT III WELDING, BRAZING, SOLDERING AND BONDING, MAINTENANCE PROCEDURES 12 HOURS

Soldering methods; inspection of soldered joints. Welding and brazing methods; Inspection of welded and brazed joints; Bonding methods and inspection of bonded joints. Types of defects and visual inspection techniques. Corrosion removal, assessment and re-protection. General repair methods, Structural Repair

Manual; Ageing, fatigue and corrosion control programs. Non-destructive inspection techniques including, penetrant, radiographic, eddy current, ultrasonic and borescope methods. Disassembly and re-assembly techniques. Trouble shooting techniques. Maintenance planning; Modification procedures; Stores procedures; Certification/release procedures; Interface with aircraft operation; Maintenance Inspection/Quality Control/Quality Assurance; Additional maintenance procedures; Control of life limited components

UNIT IV BEARINGS, TRANSMISSION, CONTROL CABLES 12 HOURS

Purpose of bearings, loads, material, construction; Types of bearings and their application. Testing, cleaning and inspection of bearings; Lubrication requirements of bearings; Defects in bearings and their causes. Gear types and their application; Gear ratios, reduction and multiplication gear systems, driven and driving gears, idler gears, mesh patterns; Belts and pulleys, chains and sprockets. Inspection of gears, backlash; Inspection of belts and pulleys, chains and sprockets; Inspection of screw jacks, lever devices, push-pull rod systems.

UNIT V PIPES AND UNIONS, HOSES, SPRINGS 12 HOURS

Identification of, and types of rigid and flexible pipes and their connectors used in aircraft. Standard unions for aircraft hydraulic, fuel, oil, pneumatic and air system pipes. Bending and belling/flaring aircraft pipes; Inspection and testing of aircraft pipes and hoses; Installation and clamping of pipes.

Types of springs, materials, characteristics and applications. Inspection and testing of springs.

TOTAL: 60 HOURS

COURSE OUTCOMES:

The students should be able to understand

CO1: Explain the Safety precautions-aircraft & workshop, workshop practices, tools.

CO2: Demonstrate Engineering drawings, diagrams and standards, types of corrosion.

CO3: Illustrate the Welding, brazing, soldering and bonding, maintenance procedures.

CO4: Identify the defects in Bearings, transmission, control cables

CO5: Inspect the aircraft Pipes and unions, hoses, springs.

TEXT BOOKS:

1. Airframe and Powerplant Mechanics (AC 65-15A)-Airframe Hand Book FAA-2018
2. Civil Aircraft Inspection Procedure (CAP 459) Part II Aircraft-2017
3. Michael Kroes, William Watkins, Frank Delp and Ronald Sterkenburg, “Aircraft Maintenance and Repair”, McGraw-Hill Education, 7th Edition, 2021.

REFERENCES:

1. Acceptable Methods, Techniques and practices (FAA)-EA-AC 43.13-1 A&2A
2. Aviation Maintenance Technician Hand book by FAA

WEB LINKS:

1. https://www.google.com/url?sa=t&source=web&rct=j&url=https://www.ksu.lt/wp-content/uploads/2017/06/M7-vol-1-Selected-pages-Maintenance-Practices.pdf&ved=2ahUKEwikm-yTqpfyAhUOyzgGHaARDHEQFnoECBgQAg&usg=AOvVaw0tVIIFXgrkr7I8RMTdgJlI
2. https://www.google.com/url?sa=t&source=web&rct=j&url=https://m.youtube.com/watch%3Fv%3D3eI8xEOKsq0&ved=2ahUKEwiPyKHOqpfyAhXOF4gKHRANDdwQo7QBegQIChAE&usg=AOvVaw3NIIKq13ejIB_Qd0u1kwIt
3. https://www.slideshare.net/gauravgarv5205/maintenacne-practices-introduction

24PBAR71 **PRACTICAL XI- AIRCRAFT DESIGN PROJECT I**

L	T	P	O	C
0	0	2	2	1

COURSE OBJECTIVES:

- To make the student work in groups and effectively improve their team work.
- To understand the Concepts involved in Aerodynamic design, Performance analysis and stability aspects of different types of airplanes

Exp no	EXPERIMENTS	Number of Hours
	AERODYNAMIC DESIGN	
1	Comparative studies of different types of airplanes and their specifications and performance details with reference to the design work under taken.	15
2	Preliminary weight estimation, Selection of design parameters, power plant selection, aerofoil selection, fixing the geometry of Wing, tail, control surfaces Landing gear selection.	
3	Preparation of layout drawing, construction of balance and three view diagrams of the airplane under consideration.	15
4	Drag estimation, Performance calculations, Stability analysis and V-n diagram.	

TOTAL: 30 HOURS

COURSE OUTCOMES:

CO1: To gain knowledge on different types of airplanes and their specifications

CO2: To gain knowledge on Preliminary weight estimation

CO3: To gain knowledge on Preparation of layout drawing

CO4: To understand the Drag estimation, Performance calculations

CO5: To understand the Stability analysis and V-n diagram calculations

REFERENCES:

1. D.P.Raymer," Aircraft conceptual design", AIAA Series, 2018.

WEB LINKS:

1. https://ae.ieu.edu.tr/documents/ae_405.pdf

24RBAR71 **RESEARCH PROJECT I**

L	T	P	O	C
0	0	12	2	6

- The candidate shall be required to take up a Project Work by group or individual and submit it at the end of the final year. The Head of the Department shall assign the Guide who, in turn, will suggest the Project Work to the students in the beginning of the VII Semester.
- The Project will be evaluated by an internal and an external examiner nominated by the University. The candidate concerned will have to defend his/her Project through a Viva-voce.

OVERVIEW

The aim of the course is to provide students with the skills to plan and develop a major research project in the field of aviation. The specific topic is chosen from a broad range of areas offered by academic supervisors. It may encompass specific industry issues. The project undertaken will be of the mutual interests to the student(s) and supervisor(s). Students are expected in a team environment to conduct joint research under the guidance of the academic supervisor throughout the semester. Students should note that the work completed in this unit forms the basis of AVA in the second semester.

TYPE OF PROJECT

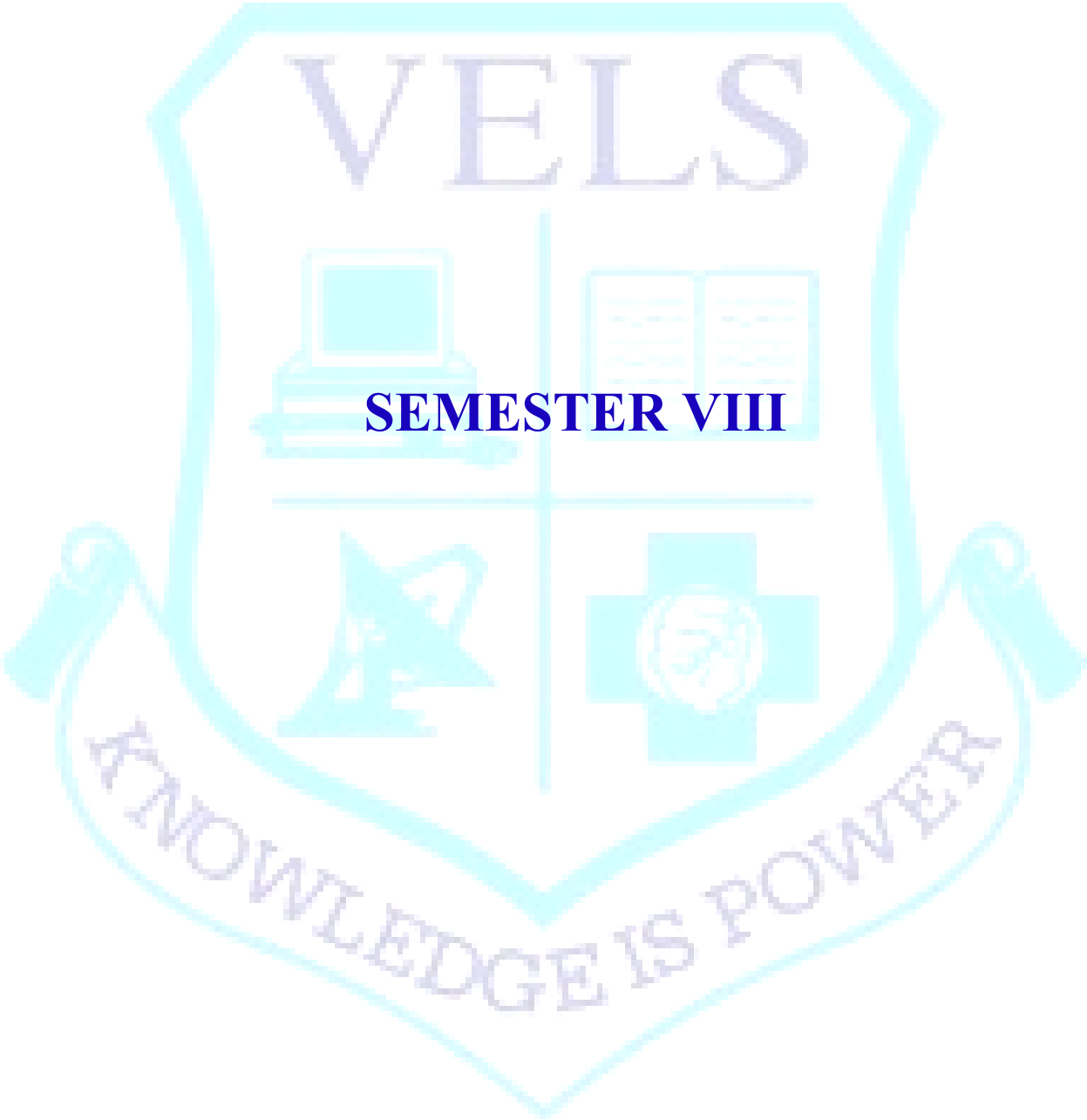
The majority of the students are expected to work on a real-life project preferably in some industry/ Research and Development Laboratories/Educational Institution/Software Company. Students are encouraged to work in the areas listed below. However, it is not mandatory for a student to work on a real-life project. The student can formulate a project problem with the help of her/his Guide and submit the project proposal of the same. Approval of the project proposal is mandatory. If approved, the student can commence working on it, and complete it.

PROJECT PRESENTATION – PHASE I

The project report in the form of PPT should be documented with scientific approach to the solution of the problem that the students have sought to address. The project report should be prepared in order to solve the problem in a methodical and professional manner, making due references to appropriate techniques, technologies and professional standards. The student should start the documentation process from the first phase so that one can easily identify the issues to be focused upon in the ultimate project report. The student should also include the details from the project diary, in which they will record the progress of their project throughout the course. The project report should contain enough details to enable examiners to evaluate the work upto methodology of research. The important points should be highlighted in the body of the report, with details often referred to appendices.

OUTCOMES:

- Identify the basic principles of academic research and the fundamental concepts of research
- Describe the characteristic features of common research methods (i.e. qualitative and quantitative methods) and debate their relative merits
- Describe the relevance and importance of ethics in research
- Within a team environment identify a research question (or project problem/objective), or questions, and justify the selection of an appropriate and ethically managed research method
- Develop an appropriate structure for a major research project
- Interpret and critically evaluate previously published research in a formal literature review.
- Propose a proper method to analyse data in the following course Research Project (Part 2) in the eight semester



SEMESTER VIII

24CBAR81 **AVIONICS**

L	T	P	O	C
3	0	0	2	3

COURSE OBJECTIVES:

The students are able to maintain avionics equipment and systems, and to solve design tasks of avionics equipment and systems.

UNIT I INTRODUCTION TO AVIONICS 9 HOURS

Need for avionics in civil and military aircraft and space systems – integrated avionics and weapon systems – typical avionics subsystems, design, technologies – Introduction to digital computer and memories.

UNIT II DIGITAL AVIONICS ARCHITECTURE 9 HOURS

Avionics system architecture – data buses – MIL-STD-1553B – ARINC – 420 – ARINC – 629.

UNIT III FLIGHT DECKS AND COCKPITS 9 HOURS

Control and display technologies: CRT, LED, LCD, EL and plasma panel – Touch screen – Direct voice input (DVI) – Civil and Military Cockpits: MFDS, HUD, MFK, HOTAS.

UNIT IV INTRODUCTION TO NAVIGATION SYSTEMS 9 HOURS

Radio navigation – ADF, DME, VOR, LORAN, DECCA, OMEGA, ILS, MLS – Inertial Navigation Systems (INS) – Inertial sensors, INS block diagram – Satellite navigation systems – GPS.

UNIT V AIR DATA SYSTEMS AND AUTO PILOT 9 HOURS

Air data quantities – Altitude, Air speed, Vertical speed, Mach Number, Total air temperature, Mach warning, Altitude warning – Auto pilot – Basic principles, Longitudinal and lateral auto pilot..

TOTAL: 45 HOURS

COURSE OUTCOMES:

After the course the students are expected to be able to

CO1: Built Digital avionics architecture

CO2: Design Navigation system

CO3: Design and perform analysis on air system.

CO4: Explain the satellite Navigation System

CO5: Explain about the Auto pilot system.

TEXT BOOKS:

1. Albert Helfrick.D., "Principles of Avionics", Avionics Communications Inc., 2021.
2. Collinson.R.P.G. "Introduction to Avionics", Chapman and Hall, 2021.

REFERENCES:

1. Middleton, D.H., Ed., "Avionics systems, Longman Scientific and Technical", LongmanGroup UK Ltd., England, 2023.
2. Spitzer, C.R. "Digital Avionics Systems", Prentice-Hall, Englewood Cliffs, N.J., U.S.A. 2021.
3. Pallet.E.H.J., "Aircraft Instruments and Integrated Systems", Longman Scientific-2020

WEB LINKS:

1. https://youtu.be/dIQi8ulQfXY
2. https://en.wikipedia.org/wiki/Avionics
3. https://www.avionics.bike/

24CBAR82 **AIR ROUTE PLANNING AND FLEET PLANNING**

L	T	P	O	C
3	0	0	2	3

COURSE OBJECTIVES:

This subject will provide students with a comprehensive overview of airline scheduling processes and operations and develop the ability to understand the procedure of building a long, medium, and short- term airline scheduling. Understand the process and principles of assigning aircraft to flights; learn the calculation of airline revenues and airline costing through the fleet assignment and fleet profitability.

UNIT I AIRLINE PLANNING 9 HOURS

Airline economics, airline demand analysis, airline demand forecasting; factors and concerns in airline scheduling and revenue.

UNIT II FLEET ASSIGNMENT 9 HOURS

Aircraft revenue management; spill cost calculation; airline fleet planning; airline fleet scheduling.

UNIT III AIRCRAFT ROTATION PLANNING 9 HOURS

Introduction to aircraft checking and maintenance; airline fleet assignment; aircraft routing calculation.

UNIT IV FLIGHT PLANNING 9 HOURS

Describe the overall procedure of airline operation; introduction to flight plan; managing flight delay/cancellation.

UNIT V AIRLINE CREW ASSIGNMENT 9 HOURS

Airline crew regulation, airline crew structure; airline crew scheduling techniques, reliability of crew pairing, robust crew pairing, reserve crew assignment. Operations Management Airline operations management; operation control center. Legal Issues Relevant legal issues, notably law of agency, arbitration and insurance

TOTAL: 45 HOURS

COURSE OUTCOMES:

The students should be able to understand

CO1: Explain airline management and how organizations operate

CO2: Illustrate economical fleet planning

CO3: Explain the principles of airlines scheduling

CO4: Exhibit reliability of aircraft and extended operational life of aircraft

CO5: A brief explanation of aircraft maintenance technology

TEXT BOOKS:

1. Massoud Bazargan, "Airline Operations and Scheduling", Routledge, 2nd Edition, 28 August,2020.
2. Gerald N. Cook, Bruce Billig, "Airline Operations and Management", Routledge; 1st edition(15 February 2017).
3. Ahmed Abdelghany, Khaled Abdelghany, "Airline Network Planning and Scheduling", John Wiley & Sons, Inc., 13 November 2018.

REFERENCES:

1. Paul Clark, "Buying the Big Jets Fleet Planning for Airlines", Taylor & Francis, 18 January2018.
2. Amedeo Odoni, Cynthia Barnhart, "The Global Airline Industry", Wiley, 6 July 2017.
3. Peter J. Bruce, "Understanding Decision-making Processes in Airline Operations Control",
4. Routledge; 1st edition (September 8, 2016).

WEB LINKS:

1. http://www.aircraftdesign.com/
2. https://en.wikipedia.org/wiki/Aircraft_design_process
3. https://www.researchgate.net/publication/326798586_Aircraft_Design_A_Conceptual_Approach_Sixth_Edition
4. https://nptel.ac.in/courses/101/106/101106035/

24CBAR83 **AIRPORT AND AIRLINE GROUND OPERATIONS**

L	T	P	O	C
4	0	0	2	4

COURSE OBJECTIVES:

The course aims to educate students on Passenger handling, cargo handling, airport/ aircraft security, Load control, airside safety and deicing operations.

UNIT I **PASSENGER HANDLING PROCEDURES** **12 HOURS**

Passenger departure check in and boarding, passenger security, passenger arrival and transit, special categories of passenger, passenger documentation, passenger irregularities, transport of animals, condition of carriage, conduct of customer services, FBO/GSP longue requirements.

UNIT II **BAGGAGE HANDLING PROCEDURES** **12 HOURS**

Baggage discrepancies, hold baggage acceptance, hold baggage prohibited items, baggage reconciliation, cabin baggage- prohibited items, baggage security, mishandled baggage, and dangerous goods. Aircraft handling procedures – general requirements, ramp safety in aircraft handling, portable water servicing, fueling, defueling- firefighting, adverse weather condition, safety cones, chocks and aircraft & GSE. Hand signals, aircraft arrivals, doors, aircraft loadings, a/c departure, a/c towing and pushing a/c hangar parking and maneuvers, FOD & ramp cleaning, air side driving safety, aircraft parking.

UNIT III **LOAD CONTROL & DISPATCH** **12 HOURS**

Load control principles, regulatory requirements, load control process, aircraft dispatch and turn around procedures, the aircraft dispatch process, flight documents.

UNIT IV **AIRSIDE SAFETY** **12 HOURS**

Airside safety –operational oversight General, airside safety and operational oversight, supervision scope, ramp supervision requirements, precision time schedules. Health safety and environment. Introduction, lifting and lowering, aircraft cabin cleaning, pandemics and epidemics- hazards, hearing loss hazards, stress hazards, alcohol, drugs and psychoactive substances hazards, fuel handling hazards, first aid.

UNIT V **DE- ICING & WINTER OPERATIONS & SECURITY DESCRIPTION** **12 HOURS**

De- icing & winter operations & security Description, de- icing fluids, general precaution during winter ops, anti- icing definitions, anti-icing application, de- icing applications, post de-icing checks, fluid- data concentration tables, hold over time, Aircraft security, security threats, potentially disruptive/unruly

passengers, reporting to local law enforcement/police.

TOTAL: 60 HOURS

COURSE OUTCOMES:

CO1: Illustrate the concept of passenger facilitation.

CO2: Illustrate the importance of baggage and check in procedure.

CO3: Discuss about the load control and dispatch.

CO4: Explain the airside safety.

CO5: Describe the concept of de-icing and winter operations and security.

TEXT BOOKS:

1. IATA Ground Operations Manual (IGOM).
2. IATA Airport Handling Manual (AHM)
3. Subash S Narayanan, "Aircraft Ground Handling", Austin Macauley (31 May 2019).
4. Norman Ashford, Pierre Coutu, John Beasley, "Airport Operations", McGraw-Hill Education, 3rd Edition, 2019.

REFERENCES:

1. Norman J. Ashford, H. P. Martin Stanton, Clifton A. Moore, Pierre Coutu, A.A.E., Ed.D., John R. Beasley, "Airport Operations", 3rd Edition, McGraw-Hill Education, 2018.
2. Jeffrey Price, Jeffrey Forrest, "Practical Airport Operations, Safety, and Emergency Management", Elsevier Science, 2016.
3. Gert Meijer, "Fundamentals of Aviation Operations", Routledge, 2020.

WEB LINKS:

1. https://www.skybrary.aero/index.php/Ground_Operations
2. https://www.sciencedirect.com/science/article/pii/S0968090X21001480
3. https://www.youtube.com/watch?v=zuijZHpPNCk

24PBAR81 **PRACTICAL XII- AVIONICS LAB**

L	T	P	O	C
0	0	2	2	1

COURSE OBJECTIVES:

To design and implementation of data buses in avionics with MIL – Std. 1553B and remote terminal configuration and their importance in different applications in the field of Avionics.

Exp no	EXPERIMENTS	Number of Hours
1	DIGITAL ELECTRONICS	
	Addition/Subtraction of binary numbers. Multiplexer/Demultiplexer Circuits. Encoder/Decoder Circuits.	20
2	MICROPROCESSORS	
	Addition and Subtraction of 8-bit and 16-bit numbers. Sorting of Data in Ascending & Descending order. Greatest in a given series & Multi-byte addition in BCD mode.	
3	AVIONICS DATA BUSES	
	Study of Different Avionics Data Buses. MIL-Std – 1553 Data Buses Configuration with Message transfer. MIL-Std – 1553 Remote Terminal Configuration.	10

TOTAL: 30 HOURS

COURSE OUTCOMES:

CO1: To gain knowledge on Digital electronics

CO2: To understand Multiplexer and Demultiplexer circuits

CO3: To gain knowledge on Addition and Subtraction of 8-bit and 16-bit numbers

CO4: To understand about Different Avionics Data Buses.

CO5: To gain knowledge on Microprocessor and its functions

REFERENCES:

1. Middleton, D.H., Ed., "Avionics systems, Longman Scientific and Technical", LongmanGroup UK Ltd., England, 2017

WEBLINKS

1. https://swanda.com/update/discover-the-evolution-of-airplane-design/

24PBAR82 **PRACTICAL XIII- AIRCRAFT DESIGN PROJECT II**

L	T	P	O	C
0	0	2	2	1

COURSE OBJECTIVES:

- To make the student work in groups and effectively improve their team work.
- To carry out the structural design part of the airplane

Exp no	EXPERIMENTS	Number of Hours
STRUCTURAL DESIGN:		
1	Preliminary design of an aircraft wing – Shrenck's curve, structural load distribution, shear force, bending moment and torque diagrams	3
2	Detailed design of an aircraft wing – Design of spars and stringers, bending stress and shear flow calculations – buckling analysis of wing panels	3
3	Preliminary design of an aircraft fuselage – load distribution on an aircraft fuselage	4
4	Detailed design of an aircraft fuselage – design of bulkheads and longerons– bending stress and shear flow calculations – buckling analysis of fuselage panels	4
5	Design of control surfaces - balancing and maneuvering loads on the tail plane and aileron, rudder loads	3
6	Design of wing-root attachment	3
7	Landing gear design	5
8	Preparation of a detailed design report with CAD drawings	5

TOTAL: 30 HOURS

COURSE OUTCOMES:

CO1: To understand the Preliminary design of an aircraft wing

CO2: To understand the Detailed design of an aircraft fuselage

CO3: To understand the Design of control surfaces

CO4: To gain knowledge on buckling analysis of wing panels

CO5: To gain knowledge on Preparation of a detailed design report with CAD drawings

REFERENCES:

1. D.P.Raymer," Aircraft conceptual design", AIAA Series,

WEB LINKS:

1. https://www.cranfield.ac.uk/academic-disciplines/aircraft-design

24RBAR81 **RESEARCH PROJECT II**

L	T	P	O	C
0	0	12	2	6

The Project will be evaluated by an internal and an external examiner nominated by the University. The candidate concerned will have to defend his/her Project through a Viva-voce.

OVERVIEW

The aim of this unit is to provide students with the skills to complete a major research project commenced in VII Semester. Students are expected, through planning and workload management in a team environment, to undertake detailed technical work in the chosen area using quantitative, qualitative, and mixed research methods. The specific project work undertaken will reflect the mutual interests of the student(s) and supervisor(s) and if applicable industry. Research findings are to be presented both in the format of a complete research project report and a formal presentation to project supervisors and peers or a forum involving poster presentation.

PROJECT REPORT – PHASE II

PROJECT REPORT:

Title Page

Original Copy of the Approved Proforma of the

Project Proposal Certificate of Authenticated work

Role and Responsibility Form

Abstract

Acknowledgement

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CHAPTER 3: REQUIREMENTS AND ANALYSIS

CHAPTER 4: DESIGN STUDY

CHAPTER 5: RESEARCH METHODOLOGY

CHAPTER 6: RESULTS AND DISCUSSION

CHAPTER 7: CONCLUSIONS

OUTCOMES

- Identify the basic principles of academic research and the fundamental concepts of research
- Review supervisor feedback and revise the literature review conducted in VII Semester
- Critically analyse primary and/or secondary data to generate solutions to research questions formed in VII Semester
- Produce a high quality written research project that examines an area of interest in Aviation
- Demonstrate effective teamwork and oral and written communication skills in order to undertake, complete and present solutions to research questions to supervisors and peers

DISCIPLINE SPECIFIC ELECTIVE

24DBAR11 **BASIC ELECTRICAL FUNDAMENTALS**

L	T	P	O	C
4	0	0	2	4

COURSE OBJECTIVES:

To understand the fundamental principles of electricity and concept of Aircraft electrical system.

UNIT I **ELECTRON THEORY, STATIC ELECTRICITY AND CONDUCTIONAND DC CIRCUITS** **12 Hours**

Structure and distribution of electrical charges within: An Atom, molecules, ions, compound's Molecular structure of conductors, semiconductors and insulators. Static Electricity and Conduction Static electricity and distribution of electrostatic charges; Electrostatic laws of attraction and repulsion; Units of charge, Coulomb's Law; Conduction of electricity in solids, liquids, gases and a vacuum. Electrical Terminology The following terms, their units and factors affecting them: potential difference, electromotive force, voltage, current, resistance, conductance, charge, conventional current flow, electron flow. DC Circuits Ohms Law, Kirchoff's Voltage and Current Laws; Calculation using the above laws to find resistance, voltage and current; Significance of the internal resistance of a supply.

UNIT II **RESISTANCE/RESISTOR, CAPACITANCE/CAPACITOR** **12 Hours**

Resistance and affecting factors; Specific resistance; Resistor colour code, values and tolerances, preferred values, wattage ratings; Resistors in series and parallel; Calculation of total resistance using series, parallel and series parallel combinations; Operation and use of potentiometers and rheostats; Operation of Wheatstone Bridge. (b) Positive and negative temperature coefficient conductance; Fixed resistors, stability, tolerance and limitations, methods of construction; Variable resistors, thermostats, voltage dependent resistors; Construction of potentiometers and rheostats; Construction of Wheatstone Bridge; Capacitance/Capacitor Operation and function of a capacitor; Factors affecting capacitance area of plates, distance between plates, number of plates, dielectric and dielectric constant, working voltage, voltage rating; Capacitor types, construction and function; Capacitor color coding; Calculations of capacitance and voltage in series and parallel circuits; Exponential charge and discharge of a capacitor, time constants; Testing of capacitors.

UNIT III **MAGNETISM, INDUCTANCE/INDUCTOR** **12 Hours**

Magnetism: Theory of magnetism; Properties of a magnet Action of a magnet suspended in the Earth's magnetic field; Magnetization and demagnetization; Magnetic shielding; Various types of magnetic material; Electromagnet's construction and principles of operations: Hand clasp rules to determine: Magnetic field around current carrying conductor. Magneto motive force, field strength, magnetic flux density, permeability, hysteresis loop, retentivity, coercive force reluctance, saturation point, eddy currents; Precautions for care and storage of magnets. Inductance/Inductor: Faraday's Law; Action of inducing a voltage in a conductor moving in a magnetic field; Induction principles; Effects of the following on the magnitude of an induced voltage: magnetic field strength, rate of change of flux, number of conductor turns; Mutual induction; The effect the rate of change of primary current and mutual inductance has on induced voltage; Factors affecting mutual inductance: number of turns in coil, physical size of coil, permeability of coil, position of coils with respect to each other; Lenz's Law and polarity determining rules; Back emf, self-induction; Saturation point; **Principle uses of inductors.**

UNIT IV **AC THEORY, RESISTIVE (R), CAPACITIVE (C) AND INDUCTIVE (L)CIRCUITS** **12 Hours**

AC Theory Sinusoidal waveform: phase, period, frequency, cycle; Instantaneous, average, root mean square, peak, peak to peak current values and calculations of these values, in relation to voltage, current and power Triangular/Square waves; Single/3 phase principles. Resistive (R), Capacitive (C) and Inductive (L) Circuits Phase relationship of voltage and current in L, C and R circuits, parallel, series and series parallel; Power dissipation in L, C and R circuits; Impedance, phase angle, power factor and current calculations; True power, apparent power and reactive power calculations.

UNIT V **TRANSFORMERS, FILTERS** **12 Hours**

Transformers: Transformer construction principles and operation; Transformer losses and methods for overcoming them; Transformer action under load and no-load conditions; Power transfer, efficiency, polarity markings; Calculation of line and phase voltages and currents; Calculation of power in a three-phase system; Primary and Secondary current, voltage, turns ratio, power, efficiency; Auto transformers. Filters: Operation, application and uses of the following filters: low pass, high pass, band pass, band stop.

TOTAL: 60 HOURS

COURSE OUTCOMES:

After the course the students are expected to be able to

CO1: Explain the electron theory, electrical terminology and DC circuits.

CO2: Analyze the characteristics of resistor and capacitor.

CO3: Comprehend the characteristics & properties of magnetism and interrelation with electricity.

CO4: Design the AC circuits, comprehend the characteristics and the principle of each component.

CO5: Analyze the working of Transformers and Filters in electrical system.

TEXT BOOKS:

1. B L Theraja and AK Theraja, "A Textbook of Electrical Technology _ Vol I", S Chand; Twenty Third edition, 1959.

1. 2. E. H. J. Pallett, "Aircraft electrical systems", Pearson Education, Third Edition, 2006.

REFERENCES:

1. Aircraft Technical Book Company LLC, "EASA Electrical Fundamentals Aviation Maintenance Technician Certification Series, Module 03", 2016.

2. David Wyatt and Mike Tooley, "Aircraft Electrical and Electronic Systems", Routledge; 2nd edition (29 May 2018).

3. Hughes, "Hughes Electrical and Electronic Technology", Pearson Education India; 10th edition (1

1. January 2010).

WEB LINKS:

1. https://soaneemrana.org/onewebmedia/COMPLETE%20MODULE%203%201.pdf
2. http://eng.sut.ac.th/me/box/1_54/437306/ebooksclub.pdf
3. https://www.ksu.lt/wp-content/uploads/2017/04/KSU-M3-Selected-pages.pdf

24DBAR12 **AIR TRAFFIC CONTROL**

L	T	P	O	C
4	0	0	2	4

COURSE OBJECTIVES:

- To introduce the basic of air traffic control.
- To impart knowledge about air traffic systems.
- To gain more knowledge on flight information systems.
- To learn about aerodrome data.
- To gain knowledge on navigation systems..

UNIT I BASIC CONCEPTS 12 Hours

Objectives of air traffic control systems - Parts of ATC services – Scope and Provision of ATCs – VFR & IFR operations – Classification of ATS air spaces – Various kinds of separation – Altimeter setting procedures – Establishment, designation and identification of units providing ATS – Division of responsibility of control.

UNIT II AIR TRAFFIC SYSTEMS 12 Hours

Area control service, assignment of cruising levels - minimum flight altitude - ATS routes and significant points – RNAV and RNP – Vertical, lateral and longitudinal separations based on time / distance –ATC clearances – Flight plans – position report

UNIT III FLIGHT INFORMATION SYSTEMS 12 Hours

Radar service, Basic radar terminology – Identification procedures using primary / secondary radar – performance checks – use of radar in area and approach control services – assurance control and co-ordination between radar / non radar control – emergencies – Flight information and advisory service – Alerting service – Co-ordination and emergency procedures – Rules of the air

UNIT IV AERODROME DATA 12 Hours

Aerodrome data - Basic terminology – Aerodrome reference code – Aerodrome reference point – Aerodrome elevation – Aerodrome reference temperature – Instrument runway, physical Characteristics; length of primary / secondary runway – Width of runways – Minimum distance between parallel runways etc. – obstacles restriction.

UNIT V NAVIGATION AND OTHER SERVICES 12 Hours

Visual aids for navigation Wind direction indicator – Landing direction indicator – Location and characteristics of signal area – Markings, general requirements – Various markings – Lights, general requirements – Aerodrome beacon, identification beacon – Simple approach lighting system and various lighting systems – VASI & PAPI - Visual aids for denoting obstacles; object to be marked and lighter – Emergency and other services.

TOTAL: 60 HOURS

COURSE OUTCOMES:

Students who successfully complete this course will be able to:

CO1 Classify the requirement of air traffic control systems and types of air traffic control system.

CO2 Explain in flight information systems and rules of air traffic systems.

CO3 Explore the emergency procedure and air rules followed by air traffic control systems.

CO4 Describe the aerodrome data.

CO5 Gain the information of navigation and emergency procedures in the air traffic control systems.

TEXT BOOKS:

1. AIP (India) Vol. I & II, "The English Book Store", 17-1, Connaught Place, New Delhi.
2. "Aircraft Manual (India) Volume I", Latest Edition – The English Book Store, 17-1, Connaught Place, New Delhi.

REFERENCE BOOKS:

1. "PANS – RAC – ICAO DOC 4444", Latest Edition, The English Book Store, 17-1, Connaught Place, New Delhi.
2. Michael S. Nolan., "Fundamentals of Air Traffic Control", Cengage Learning.
3. Wells. A-Airport Planning and Management, 4th Edition- McGraw-Hill, London-2000

WEB LINKS:

1. https://www.iata.org/en/training/courses/airline-industry-introduction/talg50hlm/en/.

24DBAR21 **PRINCIPLE OF FLIGHT**

L	T	P	O	C
4	0	0	2	4

COURSE OBJECTIVES:

To Understand the principles of flying, application of theory in subsonic and transonic operations.

UNIT I **SUBSONIC AERODYNAMICS** **12 HOURS**

The Atmosphere – ISA, The Principle of Continuity, Bernoulli's Theorem, Streamlines and the Streamtube. Basics, laws and definitions. Two-dimensional airflow around an aerofoil Coefficients. Three-dimensional airflow around an aeroplane. Total drag

UNIT II **GROUND EFFECT, CLMAX & STALLING** **12 HOURS**

Ground effect C_{LMAX} augmentation. Means to reduce the CL–CD ratio. Aerodynamic degradation. Stall, shock stall, and upset prevention and recovery. The stall & Shock stall

UNIT III **STABILITY & CONTROL** **12 HOURS**

STABILITY: Static and dynamic stability, Static and dynamic longitudinal stability, Static directional stability, Static lateral stability, Dynamic lateral/directional stability control: General, Pitch (longitudinal) control, Yaw (directional) control, Roll (lateral) control, means to reduce control forces. Trimming.

UNIT IV **FLIGHT MECHANICS & HIGH-SPEED AERODYNAMICS** **12 HOURS**

Flight Mechanics: Forces acting on an aeroplane, Asymmetric thrust, Significant points on a polar curve Transonic Aerodynamics (HIGH SPEED AERODYNAMICS): Speeds Shock waves Effects of exceeding the critical Mach number (MCRIT) Means to influence critical Mach number (MCRIT)

UNIT V **LIMITATIONS, PROPELLERS & WINDSHEAR** **12 HOURS**

Limitations: Operating limitations, Maneuvering envelope, Gust Envelope. Propellers: Conversion of engine torque to thrust, Design features for power absorption, Secondary effects of propellers. Windshear

TOTAL: 60 HOURS

COURSE OUTCOMES:

Upon completion of this course, the students will be able to

CO1: Explain the geometric characteristics of airfoil and wing.

CO2: Analyze the forces and its effects on the aircraft when approaching extreme limits of the flight condition.

CO3: Demonstrate concept of stability and application to dynamic systems like Aircraft.

CO4: Relate basic aerodynamic principles and practices regarding flight controls.

CO5: Examine the factors affecting high-speed flight.

TEXT BOOKS:

1. CAE Oxford Aviation Academy, "PRINCIPLES OF FLIGHT", Singapore by KHL Printing Co. Pte Ltd, 2014.
2. A. C. KERMODE, "Mechanics of Flight", Pearson Education Limited, 11th Edition, 2006.
3. Steven Brandt, "Introduction to Aeronautics: A Design Perspective" 3rd edition, AIAA Education series, 2015.

REFERENCES:

1. Anderson, J.D., "Introduction to Flight", 8th edition, McGraw-Hill Higher Education,2015.
2. Jeppesen, EASA ATPL Training, "Principles of Flight Aeroplanes", Jeppesen Gmbh (1 January 2014).
3. William Rees Sears, "Introduction to Theoretical Aerodynamics and Hydrodynamics" AIAA Education series, 2011.
4. Clancy, "Aerodynamics", Shroff (1 January 2006).

WEB LINKS:

1. https://www.iata.org/en/training/courses/airline-industry-introduction/talg50hlm/en/.

24DBAR22 **INDUSTRIAL AERODYNAMICS**

L	T	P	O	C
4	0	0	2	4

COURSE OBJECTIVES:

- To learn the concepts of non-aeronautical usages of aerodynamics
- To introduce the topic of wind energy collectors
- To impart concepts of analysing vibrations during flow
- To the learn the concepts of Atmospheric boundary layer
- To introduce the basics of Flow induced vibrations.

UNIT I ATMOSPHERE 12 Hours

Types of winds, Causes of variation of winds, Atmospheric boundary layer, Effect of terrain on gradient height, Structure of turbulent flows.

UNIT II WIND ENERGY COLLECTORS 12 Hours

Horizontal axis and vertical axis machines, Power coefficient, Betz coefficient by momentum theory

UNIT III VEHICLE AERODYNAMICS 12 Hours

Power requirements and drag coefficients of automobiles, Effects of cut back angle, Aerodynamics of trains and Hovercraft.

UNIT IV BUILDING AERODYNAMICS 12 Hours

Pressure distribution on low rise buildings, wind forces on buildings. Environmental winds in city blocks, Special problems of tall buildings, building codes, Building ventilation and architectural aerodynamics.

UNIT V FLOW INDUCED VIBRATIONS 12 Hours

Effects of Reynolds number on wake formation of bluff shapes, Vortex induced vibrations, Galloping and stall flutter.

TOTAL: 60 HOURS

COURSE OUTCOMES:

At the end of the course, students will be able to

CO1: Use of aerodynamics for non- aerodynamics such as vehicle, building.

CO2: Solve the problems and able to analyze vibrations during flow

CO3 Identify the Atmospheric boundary layer and applications of wind energy collectors.

CO4 Analyse the aerodynamics of road vehicles and problems of flow induced vibrations.

CO5: Analyse the aerodynamics of buildings and problems of flow induced vibrations.

TEXT BOOKS:

1. M. Sovran (Ed), "Aerodynamics and drag mechanisms of bluff bodies and Road vehicles", Plenum press, New York, 1978.
2. Sachs. P., "Winds forces in Engineering", Pergamon Press, 1978.

REFERENCE BOOKS:

1. Blevins. R.D., "Flow Induced Vibrations", Van Nostrand, 1990.
2. Calvent. N.G., "Wind Power Principles", Charles Griffin & Co., London, 1979.

24DBAR31 **RADIO NAVIGATION**

L	T	P	O	C
3	0	0	2	3

COURSE OBJECTIVES:

Understand the functioning of various Nav aids that are made available inflight, on ground, principle behind their operation.

UNIT I **BASIC RADIO PROPAGATION THEORY, WAVE PROPAGATION, THE IONOSPHERIC LAYERS** **9 HOURS**

Basic radio propagation theory - Basic principles - Electromagnetic waves - Wave length, amplitude, phase angle, frequency - Frequency bands - Carrier, modulation, demodulation - Kind of modulation (amplitude, frequency, pulse, multiplex) - Oscillation circuit Wave propagation - Properties of Radio Waves, Ground wave - Space wave - Propagation with the frequency bands - Frequency prognosis (MUF) - fading - Factors affecting propagation (reflection, absorption, interference, twilight, shoreline, mountain, static), The Ionospheric Layers– Skip distance – dead space – Angle of Incidence – Critical Angle; Relationship between frequency &Atmospheric Condition.

UNIT II **VDF, ADF/NDB – CONTROL PANEL & TYPES OF BEARING** **9 HOURS**

Ground D/F (including classification of bearings) - principles - presentation and interpretation - coverage - range - errors and accuracy - factors affecting range and accuracy; ADF (including associated beacons and use of the radio magnetic indicator) - ADF Control Panel- Function switch- BFO circuit diagram - principles - presentation and interpretation –- coverage - range - errors and accuracy - factors affecting range and accuracy; Types of Bearing; True, Magnetic & Relative Bearing;

UNIT III **VOR & ILS** **9 HOURS**

VOR (including the use of the radio magnetic indicator) - principles - presentation and interpretation - coverage - range - errors and accuracy - factors affecting range and accuracy, ILS (Instrument Landing System) - principles - presentation and interpretation - coverage - range - errors and accuracy - factors affecting range and accuracy.

UNIT IV **RADIO ALTIMETER, DME.** **9 HOURS**

Radio Altimeter - components - frequency band - principle of operation - displays – errors DME (distance

measuring equipment) - principles - presentation and interpretation - coverage - range - errors and accuracy - factors affecting range and accuracy. Airborne Weather Radar – principles, operation, mapping, color coding.

UNIT V **RADAR PRINCIPLES, SELF-CONTAINED AND EXTERNAL- REFERRED NAVIGATION SYSTEM** **9 HOURS**

Radar- Primary and Secondary SSR secondary surveillance radar and transponder: principles - presentation and interpretation - modes and codes, including mode S; Self-contained and External-Referenced Navigation Systems - Satellite assisted navigation: GPS / GLONASS - principle of operation - advantages and disadvantages.

TOTAL: 45 HOURS

COURSE OUTCOMES:

After the course the students are expected to be able to

CO1: Explain the principle of operation of Radio Instruments for Navigation.

CO2: Summarize the Basic operation of RADAR.

CO3: Analyze about the Area Navigation System.

CO4: Discuss about self-contained and external referred navigation system.

CO5: Explain about inertial navigation/reference system (INS/IRS).

TEXT BOOKS:

1. R K Bali, “AIR NAVIGATION”, 2nd Edition, 1 January 2021.
2. CAE Oxford, “Radio Navigation”, Pratham Publishers, 2nd Edition, 2021
3. R. B. Underdown, David Cockburn, “Ground Studies for Pilots: Radio Aids”, Wiley-Blackwell; 6th edition (20 April 2022).

REFERENCES:

1. Keith Williams, “Radio Navigation 1000 questions and answers with explanation”, The English Book Store (The Aviation People) (1 January 2022).
2. Alan E. Bramson, Neville Birch and Alan Branson, “Radio Navigation for Pilots”, Gardners Books; 3rd edition (June 30, 2021).

WEB LINKS:

1. https://www.sciencedirect.com/topics/physics-and-astronomy/radio-navigation

24DBAR32 **AERODYNAMIC OF DRONES**

L	T	P	O	C
3	0	0	2	3

COURSE OBJECTIVES:

- To introduce students to the basic concepts of payloads in UAV.
- To understand the various sensor system of an UAV.
- To introduce with the concepts of data algorithms and architectures.
- To introduce the concepts of artificial neural networks.
- To expose students to the concept of fuzzy logic.

UNIT I PAYLOAD FOR UAV 9 HOURS

Introduction – Types – Non-dispensable Payloads - Electro-optic Payload Systems - Electro-optic Systems Integration - Radar Imaging Payloads - Other Non-dispensable Payloads – Dispensable Payloads - Payload Development.

UNIT II SENSOR 9 HOURS

Data fusion applications to multiple sensor systems - Selection of sensors - Benefits of multiple sensor systems - Influence of wavelength on atmospheric attenuation - Fog characterization - Effects of operating frequency on MMW sensor performance - Absorption of MMW energy in rain and fog - Backscatter of MMW energy from rain - Effects of operating wavelength on IR sensor performance - Visibility metrics - Atmospheric and sensor system computer simulation models

UNIT III DATA FUSION ALGORITHMS AND ARCHITECTURES 9 HOURS

Definition of data fusion - Level 1 processing - Detection, classification, and identification algorithms for data fusion - State estimation and tracking algorithms for data fusion - Level 2, 3, and 4 processing - Data fusion processor functions - Definition of an architecture - Data fusion architectures - Sensor-level fusion - Central-level fusion - Hybrid fusion

UNIT IV ARTIFICIAL NEURAL NETWORKS 9 HOURS

Applications of artificial neural networks - Adaptive linear combiner - Linear classifiers - Capacity of linear classifiers - Nonlinear classifiers - Madaline - Feedforward network - Capacity of nonlinear classifiers - Supervised and unsupervised learning - Supervised learning rules - Voting Logic Fusion

UNIT V FUZZY LOGIC AND FUZZY NEURAL NETWORKS 9 HOURS

Conditions under which fuzzy logic provides an appropriate solution - Illustration of fuzzy logic in an automobile antilock braking system - Basic elements of a fuzzy system - Fuzzy logic processing - Fuzzy centroid calculation.

TOTAL: 45 HOURS

COURSE OUTCOMES:

Students who successfully complete this course will be able to:

CO1 Calculate the payloads in UAV.

CO2 Explain the concepts sensor systems.

CO3 Predict the data fusion algorithms and architectures.

CO4 Learn the basics neural network systems

CO5 Design various network schemes.

TEXT BOOKS:

1. Reg Austin Aeronautical Consultant, AJohn "Unmanned aircraft systems UAVs design, development and deployment" Wiley and Sons, Ltd., Publication,2020
2. David L. Hall, Sonya A. H. McMullen "Mathematical Techniques in Multi-sensor Data Fusion", by Artech, 2021
3. Martin Liggins II David Hall, James "Handbook of Multisensor Data Fusion: Theory and Practice", Second Edition (Electrical Engineering & Applied Signal Processing Series), 2019

REFERENCES:

1. Lawrence A. Klein, "Sensor and Data Fusion: A Tool for Information Assessment and Decision Making", Second Edition, SPIE Press, 2023.
2. Jitendra R. Raol, "Multi-Sensor Data Fusion with MATLAB", CRC Press, 2020

WEB LINKS:

1. https://www.sciencedirect.com/topics/physics-and-astronomy/radio-navigation

24DBAR41 **AEROSPACE PROPULSION**

L	T	P	O	C
4	0	0	2	4

COURSE OBJECTIVES:

To introduce basic concepts and salient features of engine components of jet-propelled engines which are operated in atmosphere.

UNIT I PISTON ENGINE **12 HOURS**

Classification – components – crank case – crank shaft – cam – valve timing – Otto cycle – Lubrication system – Carburetor – spark plug – cylinder compression check

UNIT II JET ENGINE - INLETS **12 HOURS**

Illustration of working of gas turbine engine – the thrust equation – factors affecting thrust – effect of pressure, velocity and temperature Types - turboprop, turbofan and turbojet Inlet guide vanes – Ram effect – Area Mach number relation – sub sonic and supersonic inlets

UNIT III COMPRESSORS AND COMBUSTION CHAMBERS **12 HOURS**

Principle of operation of centrifugal compressor and axial flow compressor– Combustion chamber - Atomization – fuel nozzle – Types of combustion chamber – flame stabilization – effect of operating variables on performance

UNIT IV TURBINES FOR JET ENGINES **12 HOURS**

Principle of operation of axial flow turbines– limitations of radial flow turbines- performance characteristics of axial flow turbine– turbine blade cooling methods - Guide vanes – Centrifugal flow compressor

UNIT V EXHAUST SYSTEM **12 HOURS**

Convergent nozzle and CD nozzle - ejector and variable area nozzles - interaction of nozzle flow with adjacent surfaces – thrust reversal - methods of thrust augmentation – Noise prevention – Engine emissions

TOTAL: 60 HOURS

COURSE OUTCOMES:

After the course the students are expected to be able to

CO-1: Identify the engine components of jet-propelled engines.

CO-2: Describe the principal figures of inlets, nozzles and combustion chambers for jet engines

CO-3: Gain knowledge on compressors for jet engines.

CO-4: Understand about turbines for jet engines

CO-5: Understand about operating principles of ramjet engine

TEXT BOOKS:

1. Hill, P.G. & Peterson, C.R. "Mechanics & Thermodynamics of Propulsion" Addison – Wesley Longman INC, 2019.
2. James Award, "Aerospace Propulsion System", 1st Edition, Airbooks Publishers, 2021

REFERENCES:

1. Cohen, H. Rogers, G.F.C. and Saravana muttoo, H.I.H. "Gas Turbine Theory", Longman, 2019.
2. Oates, G.C., "Aero thermodynamics of Aircraft Engine Components", AIAA Education Series, NewYork, 2021

WEB LINKS:

1. **https://www.britannica.com/technology/airplane/Propulsion-systems**
2. **https://en.m.wikipedia.org/wiki/Jet_propulsion**
3. **https://www.grc.nasa.gov/www/k-12/airplane/bgp.html**

24DBAR42 **DESIGN OF UAV SYSTEMS**

L	T	P	O	C
4	0	0	2	4

COURSE OBJECTIVES:

- To expose students to concepts needed in modelling and analysing an unmanned system.
- To expose students to the design and development of UAV.
- To expose students to the type of payloads used in UAV.
- To study path planning
- To understand the avionics hardware used in the UAV

UNIT I INTRODUCTION TO UAV 12 HOURS

History of UAV –classification – Introduction to Unmanned Aircraft Systems--models and prototypes– System Composition-applications

UNIT II THE DESIGN OF UAV SYSTEMS 12 HOURS

Introduction to Design and Selection of the System- Aerodynamics and Airframe Configurations Characteristics of Aircraft Types- Design Standards and Regulatory Aspects-UK, USA and Europe Design for Stealth--control surfaces-specifications.

UNIT III AVIONICS HARDWARE 12 HOURS

Autopilot – AGL-pressure sensors-servos-accelerometer –gyros-actuators- power supply processor, integration, installation, configuration, and testing

UNIT IV COMMUNICATION PAYLOADS AND CONTROLS 12 HOURS

Payloads-Telemetry-tracking-Aerial photography-controls-PID feedback-radio control frequency range – modems-memory system-simulation-ground test-analysis-trouble shooting.

UNIT V THE DEVELOPMENT OF UAV SYSTEMS 12 HOURS

Waypoints navigation-ground control software- System Ground Testing- System In-flight Testing Future Prospects and Challenges-Case Studies – Mini and Micro UAVs.

TOTAL: 60 HOURS

COURSE OUTCOMES:

Students who successfully complete this course will be able to:

CO1 Design UAV system

CO2 Prepare preliminary design requirements for an unmanned aerial vehicle.

CO3 Identify different hardware for UAV

CO4 Perform system testing for unmanned aerial vehicles.

CO5 Design micro aerial vehicle systems by considering practical limitations

TEXT BOOKS:

1. Paul G Fahlstrom, Thomas J Gleason, “Introduction to UAV Systems”, UAV Systems, Inc, 2019
2. Reg Austin “Unmanned Aircraft Systems UAV design, development and deployment”, Wiley, 2020.

REFERENCES:

1. Dr. Armand J. Chaput, “Design of Unmanned Air Vehicle Systems”, Lockheed Martin Aeronautics Company, 2019
2. Kimon P. Valavanis, “Advances in Unmanned Aerial Vehicles: State of the Art and the Road to Autonomy”, Springer, 2021
3. Robert C. Nelson, Flight Stability and Automatic Control, McGraw-Hill, Inc, 2019

WEB LINKS:

1. https://www.britannica.com/technology/unmanned-aerial-vehicle

24DBAR51 AIRCRAFT PERFORMANCE AND STABILITY

L	T	P	O	C
3	0	0	2	3

COURSE OBJECTIVES:

To acquire the knowledge on cruising flight performance

- To learn about the level flight performance
- To know the concepts of manoeuvring flight performance
- To learn the basics of Static and dynamic stability
- To learn the various types of Dynamic instability

UNIT I CRUISING FLIGHT PERFORMANCE 9 HOURS

Forces and moments acting on a flight vehicle - Different types of drag – Drag polar - Variation of thrust, power with velocity and altitudes for air breathing engines. Variation of thrust, power with velocity and altitudes for air breathing engines

UNIT II LEVEL FLIGHT PERFORMANCE 9 HOURS

Equation of motion of a rigid flight vehicle Performance of airplane in level flight – Power available and power required curves. Maximum speed in level flight – Conditions for minimum drag and power required.

UNIT III MANEUVERING FLIGHT PERFORMANCE 9 HOURS

Range and endurance - Climbing and gliding flight (Maximum rate of climb and steepest angle of climb, minimum rate of sink and shallowest angle of glide) – Takeoff and landing - Turning performance - Bank angle and load factor - V-n diagram and load factor

UNIT IV STATIC AND DYNAMIC STABILITY 9 HOURS

Static and dynamic stability - Purpose of controls in airplanes - CG location - - Aerodynamic balancing - Dihedral effect - Lateral control - Coupling between rolling and yawing moments - Adverse yaw effects - Aileron reversal - Static directional stability - Weather cocking effect - Rudder requirements - One engine inoperative condition - Rudder lock.

UNIT V DYNAMIC INSTABILITY 9 HOURS

Dynamic stability - Spiral, divergence, Dutch roll, auto rotation and spin.

TOTAL: 45 HOURS

COURSE OUTCOMES:

Upon completion of this course, the students will be able to

CO1: Illustrate the cruising flight performance

CO2: Identify the level flight performance

CO3: Explain the concepts of maneuvering flight performance

CO4: Identify the basics of Static and dynamic stability

CO5: Understand the various types of Dynamic instability

TEXT BOOKS:

1. John David Anderson, "Introduction to Flight". Published by McGraw-Hill Education-2017
2. Nelson, R.C. "Flight Stability and Automatic Control", McGraw-Hill Book Co., 2020.
3. Perkins, C.D., and Hage, R.E., "Airplane Performance stability and Control", John Wiley & Son:, Inc, NY, 2019.

REFERENCES:

1. Babister, A.W., "Aircraft Dynamic Stability and Response", Pergamon Press, Oxford, 2021.
2. Dommasch, D.O., Sherby, S.S., and Connolly, T.F., "Aeroplane Aero dynamics", Third Edition, Issac Pitman, London, 2020.
3. Etkin, B., "Dynamics of Flight Stability and Control", Edn. 2, John Wiley, NY, 2018

WEB LINKS:

1. https://archive.nptel.ac.in/courses/101/104/101104061/

24DBAR52 **WIND TUNNEL TECHNIQUES**

L	T	P	O	C
3	0	0	2	3

COURSE OBJECTIVES:

- To learn the Types of low-speed Wind tunnels and non-dimensional numbers with its applications.
- To learn the Types of high-speed Wind tunnels and with its calibration methods.
- To Understand the Special Wind tunnels and with its calibration methods with its design methods.
- To describe flow visualization techniques and data acquisition methods.
- To understand the functions of various instruments associated with wind tunnel

UNIT I **LOW SPEED WIND TUNNELS** **9 HOURS**

Classification –non-dimensional numbers-types of similarities - Layout of open circuit and closed circuit subsonic wind tunnels – design parameters-energy ratio - HP calculations - Calibration methods.

UNIT II **HIGH SPEED WIND TUNNELS** **9 HOURS**

Blow down, in draft and induction tunnel layouts and their design features -Transonic, and supersonic tunnels- peculiar features of these tunnels and operational difficulties - sample design calculations and calibration methods.

UNIT III **SPECIAL WIND TUNNEL TECHNIQUES** **9 HOURS**

Types of Special Wind Tunnels – Hypersonic, Gun and Shock Tunnels – Design features and calibration methods- Intake tests – store carriage and separation tests - wind tunnel model design for these tests

UNIT IV **WIND TUNNEL INSTRUMENTATION** **9 HOURS**

Instrumentation and sensors required for both steady and unsteady measurements – Force measurements using three component and six component balances – calibration of measuring instruments – error estimation and uncertainty analysis

UNIT V **FLOW VISUALIZATION AND NON-INTRUSIVE FLOW DIAGNOSTICS** **9 HOURS**

Smoke and Tuft grid techniques – Dye injection special techniques – Oil flow visualization and PSP techniques - Optical methods of flow visualization – PIV and Laser Doppler techniques – Image processing and data deduction

TOTAL: 45 HOURS

COURSE OUTCOMES:

Students who successfully complete this course will be able to:

CO1: Explain the uses of various types of tunnels and its losses

CO2: Experiment with calibration of different types of high-speed tunnels

CO3: Make use of various special tunnels and its applications

CO4: Make use of various measurement techniques of instruments of wind tunnel

CO5: Can use various techniques for aerodynamic data generation

TEXT BOOKS:

1. NAL-UNI Lecture Series 12:" Experimental Aerodynamics", NAL SP 98 01 April 2020
2. Rae, W.H. and Pope, A., "Low Speed Wind Tunnel Testing", John Wiley Publication, 2019.

REFERENCES:

1. Lecture course on Advanced Flow diagnostic techniques 17-19 September 2018 NAL, Bangalore
2. Pope, A., and Goin, L., "High Speed Wind Tunnel Testing", John Wiley,2019.
3. Rathakrishnan, E., “Instrumentation, Measurements, and Experiments in Fluids,” CRC Press – Taylor & Francis, 2017.
4. Short term course on Flow visualization techniques, NAL, 2019

WEB LINKS:

1. https://www.youtube.com/watch?v=L1AYo9Mk1EI

CYBER SECURITY

L	T	P	O	C
3	0	0	2	3

COURSE OBJECTIVES:

- To provide foundational knowledge of cyberspace, web technologies, and the evolving landscape of cyber security and its challenges.
- To familiarize students with the types of cyber crimes, legal frameworks including the IT Act 2000, and organizational measures for mitigating cyber threats.
- To equip students with practical understanding of securing digital devices, social media usage, e-commerce platforms, and digital payment systems.

UNIT I INTRODUCTION TO CYBER SECURITY 9 Hours

Defining Cyberspace and Overview of Computer and Web-technology, Architecture of cyberspace, Communication and web technology, Internet, World wide web, Advent of internet, Internet infrastructure for data transfer and governance, Internet society, Regulation of cyberspace, Concept of cyber security, Issues and challenges of cyber security

UNIT II CYBER CRIME AND CYBER LAW 9 Hours

Classification of cyber crimes, Common cyber crimes- cyber crime targeting computers and mobiles, cyber crime against women and children, financial frauds, social engineering attacks, malware and ransomware attacks, zero day and zero click attacks, Cybercriminals modus-operandi , Reporting of cyber crimes, Remedial and mitigation measures, Legal perspective of cyber crime, IT Act 2000 and its amendments, Cyber crime and offences, Organisations dealing with Cyber crime and Cyber security in India, Case studies.

UNIT III SOCIAL MEDIA OVERVIEW AND SECURITY 9 Hours

Introduction to Social networks. Types of Social media, Social media platforms, Social media monitoring, Hashtag, Viral content, Social media marketing, Social media privacy, Challenges, opportunities and pitfalls in online social network, Security issues related to social media, Flagging and reporting of inappropriate content, Laws regarding posting of inappropriate content, Best practices for the use of Social media, Case studies.

UNIT IV E – COMMERCE AND DIGITAL PAYMENTS 9 Hours

Definition of E- Commerce, Main components of E-Commerce, Elements of E-Commerce security, E-Commerce threats, E-Commerce security best practices, Introduction to digital payments, Components of digital payment and stake holders, Modes of digital payments- Banking Cards, Unified Payment Interface (UPI), eWallets, Unstructured Supplementary Service Data (USSD), Aadhar enabled payments, Digital payments related common frauds and preventive measures. RBI guidelines on digital payments and customer protection in unauthorised banking transactions. Relevant provisions of Payament Settlement Act,2007.

UNIT V DIGITAL DEVICES SECURITY, TOOLS AND TECHNOLOGIES FOR CYBER SECURITY **9 Hours**

End Point device and Mobile phone security, Password policy, Security patch management, Data backup, Downloading and management of third-party software, Device security policy, Cyber Security best practices, Significance of host firewall and Ant-virus, Management of host firewall and Anti-virus, Wi-Fi security, Configuration of basic security policy and permissions.

TOTAL 45 HOURS

COURSE OUTCOMES:

After the course the students are expected to be able to

CO1: To explain the architecture of cyberspace, web technologies, and internet infrastructure with respect to cyber security.

CO2: To Identify various cyber crimes and evaluate legal remedies under the IT Act 2000 and associated cyber laws in India.

CO3: To Analyze the structure and impact of social media platforms and assess the security risks and legal implications of online content..

CO4: To understand e-commerce and digital payment mechanisms, including associated frauds, security practices, and relevant legal provisions.

CO5: To Apply cyber security tools and best practices for securing personal and organizational digital devices, networks, and systems.

TEXT BOOKS:

1. Cyber Crime Impact in the New Millennium, by R. C Mishra , Auther Press. Edition2010.

2. Cyber Security Understanding Cyber Crimes, Computer Forensics and LegalPerspectives by Sumit Belapure and Nina Godbole, Wiley India Pvt. Ltd. (FirstEdition, 2011)

3. Security in the Digital Age: Social Media Security Threats and Vulnerabilities byHenry A. Oliver, Create Space Independent Publishing Platform. (Pearson , 13thNovember, 2001)

REFERENCE BOOKS:

1. Electronic Commerce by Elias M. Awad, Prentice Hall of India Pvt Ltd.

2. Cyber Laws: Intellectual Property & E-Commerce Security by Kumar K, DominantPublishers.

3. Network Security Bible, Eric Cole, Ronald Krutz, James W. Conley, 2nd Edition,Wiley India Pvt. Ltd.

4. Fundamentals of Network Security by E. Maiwald, McGraw Hill

24DBAR61 **AERO ENGINE MAINTENACE AND REPAIR**

L	T	P	O	C
4	0	0	2	4

COURSE OBJECTIVES:

Students undergoing this course are expected to learn the maintenance aspect and testing procedure of gasturbine engine.

UNIT I CLASSIFICATION OF PISTON ENGINE COMPONENTS 12 HOURS

Types of piston engines-principles of operation-function of components-materials used-details of starting theengines-details of carburetion and injection systems for small and large engines-ignition system components- spark plug details-Engine operating conditioned at various altitudes-maintenance and inspection check to be carried out.

UNIT II INSPECTION OF PISTON ENGINES 12 HOURS

Inspection and maintenance and troubleshooting-inspection of all engine components-Daily and routine checks-overhaul procedure-compression testing of cylinders-special inspection schedules-engine fuel, control and exhaust systems-engine mount and super charger-checks and inspection procedure.

UNIT III FAULT DIAGNOSTICS OF PISTON ENGINES 12 HOURS

Symptoms of failure-fault diagnostics-case studies of different engine systems: tools and equipment for replacement of park and their repair. Engine testing: engine testing procedures and schedule preparation- online maintenance.

UNIT IV CLASSIFICATION OF JET ENGINE COMPONENTS 12 HOURS

12 types of jet engines-principles of operation-functions of components-materials used-details of starting and operating procedure-gas turbine engine inspection & checks-use of instruments-etc. Maintenance procedure of gas turbine engines-trouble shooting and rectification procedure-component maintenance procedures- systems maintenance procedure. Gas turbine testing procedures-test schedule preparation-storage of engines- preservation and de-preservation procedures.

UNIT V OVERHAUL PROCEDURES 12 HOURS

Engine Overhaul Procedures-Inspections and Cleaning of Components-Repair Schedules for Overhaul-Balancing of Gas Turbine Components. Trouble Shooting-Procedures for Rectification-Condition Monitoring of The Engine on Ground and At Altitude-Engine Health Monitoring and Corrective Methods.

TOTAL: 60 HOURS

COURSE OUTCOMES:

After the course the students are expected to be able to

CO1: Explain the classification of piston engine components.

CO2: Illustrate the usage of inspection and maintenance tools.

CO3: Explain the engine testing procedures.

CO4: Describe about the inspection of engine components.

CO5: Illustrate overhauling procedure of aero engine.

TEXT BOOKS:

1. KROES & WILD," Aircraft Power Palnts",7th Edition-McGraw Hill, York, 2020
2. Dale Crane, "Aviation Maintenance Technician: Powerplant", Aviation Supplies & Academics Inc, September 2021.

REFERENCES:

1. Michael Kroes, William Watkins, Frank Delp, Ronald Sterkenburg, "Aircraft Maintenance and Repair", 7th Edition, McGraw-Hill Education, 16 May 2023.
2. Shevantha K. Weerasekera, "Introduction to Maintenance, Repair and Overhaul of Aircraft, Enginesand Components", SAE International (30 December 2020).
3. Rumman Akhtar, "Jet Engine Maintenance Techniques", 21 May 2021.
4. Gas Turbine Engines for Aircraft Maintenance EASA Module 15.

WEB LINKS:

1. https://www.studocu.com/in/document/anna-university/be/aero-engine-maintenance-and-repair-notes-1/7926719
2. https://youtu.be/OYVyRTiQTgs
3. https://youtu.be/npQ-JU4_W9g
4. http://www.bits.de/NRANEU/others/amd-us-archive/FM1-506%281990%29.pdf

24DBAR62 **AEROSPACE MATERIALS**

L	T	P	O	C
4	0	0	2	4

COURSE OBJECTIVES:

To study the types of mechanical behaviour of materials for aircraft applications

UNIT I ELEMENTS OF AEROSPACE MATERIALS 12 HOURS

Structure of solid materials – Atomic structure of materials – crystal structure – miller indices – density – packing factor – space lattices – x-ray diffraction – imperfection in crystals – physical metallurgy - general requirements of materials for aerospace applications

UNIT II MECHANICAL BEHAVIOUR OF MATERIALS 12 HOURS

Linear and non linear elastic properties – Yielding, strain hardening, fracture, Bauchinger's effect – Notch effect testing and flaw detection of materials and components – creep and fatigue - comparative study of metals, ceramics plastics and composites

UNIT III CORROSION & HEAT TREATMENT OF METALS AND ALLOYS 12 HOURS

Types of corrosion – effect of corrosion on mechanical properties – stress corrosion cracking – corrosion resistance materials used for space vehicles heat treatment of carbon steels – aluminium alloys, magnesium alloys and titanium alloys – effect of alloying treatment, heat resistance alloys – tool and die steels, magnetic alloys,

UNIT IV CERAMICS AND COMPOSITES 12 HOURS

Introduction – powder metallurgy - modern ceramic materials – cermets - cutting tools – glass ceramic – production of semi-fabricated forms - plastics and rubber – carbon/carbon composites, fabrication processes involved in metal matrix composites - shape memory alloys – applications in aerospace vehicle design, open and close mould processes.

UNIT V HIGH TEMPERATURE MATERIALS CHARACTERIZATION 12 HOURS

Classification, production and characteristics – methods and testing – determination of mechanical and thermal properties of materials at elevated temperatures – application of these materials in thermal protection systems of aerospace vehicles – super alloys – high temperature material characterization.

TOTAL: 60 HOURS

COURSE OUTCOMES:

CO1: Knowledge in usage of materials in aircraft

CO2: Knowledge in usage of composite materials in aircraft component design.

CO3: Role of corrosion and heat treatment processes of aircraft materials

CO4: Exposure to high temperature materials for space applications

CO5: Provide the necessary mathematical knowledge that are needed in understanding their significance and operation.

TEXT BOOKS:

1. Titterton.G., ”Aircraft Materials and Processes", V Edition, Pitman Publishing Co., 2021

REFERENCES:

1. Martin, J.W., "Engineering Materials, Their properties and Applications", Wykedham Publications (London) Ltd., 2020
2. Raghavan.V., "Materials Science and Engineering", Prentice Hall of India, New Delhi, 2019.
3. Van Vlack.L.H., "Materials Science for Engineers", Addison Wesley, 2017.

WEB LINKS:

1. https://link.springer.com/chapter/10.1007/978-3-662-43373-7_4
2. https://www.researchgate.net/profile/Antonio-J-M-Castro/publication/277046924_Airline_Operations_Control_A_New_Concept_for_Operations_Recovery/links/55a76ca108ae410caa75320d/Airline-Operations-Control-A-New-Concept-for-Operations-Recovery.pdf?origin=publication_detail
3. https://core.ac.uk/download/pdf/4432416.pdf

24DBAR71 **DANGEROUS GOODS AND CARGO**

L	T	P	O	C
4	0	0	2	4

COURSE OBJECTIVES:

To ensure that the students have the necessary skills to accept, handle and process shipments containing DGR goods.

UNIT I **TRANSPORT OF DGR GOODS** **12 HOURS**

Transport of DGR Goods: Approval for the transport of DGR GOODS and its legal background, Terminology, Marking and Labelling of the packages, segregation of DGR goods, Loading and stowage of DGR goods.

UNIT II **RADIOACTIVE MATERIALS** **12 HOURS**

Radioactive materials, Dry Ice, Polymeric breads, Magnetized materials, Battery driven wheel chairs.

UNIT III **NOTOC** **12 HOURS**

NOTOC: Inspection for Damage, Leakage or Contamination of Dangerous Goods.

UNIT IV **DANGEROUS GOOD RECORDS** **12 HOURS**

Retention of Dangerous goods records

UNIT V **TRANSPORT OF WEAPONS AND AMMUNITION** **12 HOURS**

Procedure for transport of weapons and Ammunition

TOTAL: 60 HOURS

COURSE OUTCOMES:

The students should be able to understand

CO1: Apply the correct DGR and cargo regulations

CO2: Identify dangerous goods which are forbidden for air transport

CO3: Identify the nine classes of DGR by their principle criteria

CO4: Read the alphabetical list of DGR and apply the list of information it contains

CO5: Apply the general packing requirements and specific packing instructions

TEXT BOOKS:

1. IATA Dangerous Goods Regulations (DGR), 2021 62rd edition
2. ICAO Technical Instructions (TI).

REFERENCES:

1. Babu P, “Introduction to Air Cargo Management”, 12 November 2020.
2. Cooperative Research for Hazardous Materials Transportation: Defining the Need, Converging on Solutions -- Special Report 283.

WEB LINKS:

1. https://skybrary.aero/bookshelf/books/1178.pdf
2. https://www.youtube.com/watch?v=kpLLWngavFI
3. https://www.youtube.com/user/IATAtv/search?query=DANGEROUS%20

24DBAR72 **AIRFRAME MAINTENANCE AND REPAIR**

L	T	P	O	C
4	0	0	2	4

COURSE OBJECTIVES:

To make the students to understand the Airframe components and the tools used to maintain the components. Defect investigation, methods to carry out investigation and the detailed maintenance and practice procedures.

UNIT I MAINTENANCE OF AIRCRAFT STRUCTURAL COMPONENTS 12 HOURS

Equipments used in welding shop and their maintenance - Ensuring quality welds - Welding jigs and fixtures - Soldering and brazing – laser welding. Sheet metal repair and maintenance: Selection of materials; Repair schemes; Fabrication of replacement patches; Tools - power/hand; Repair techniques; Peening - Close tolerance fasteners; Sealing compounds; forming/shaping; Calculation of weight of completed repair; Effect of weight - change on surrounding structure. Sheet metal inspection - N.D.T. Riveted repair design - Damage investigation - Reverse engineering.

UNIT II PLASTICS AND COMPOSITES IN AIRCRAFT 12 HOURS

Review of types of plastics used in airplanes - Maintenance and repair of plastic components - Repair of cracks and holes - various repairs schemes - Scopes. Cleaning of fibre reinforced plastic (FRP) materials prior to repair; Break test - Repair Schemes; FRP/honeycomb sandwich materials; laminated FRP structural members and skin panels; Tools/equipment; Vacuum-bag process. Special precautions – Autoclaves

UNIT III AIRCRAFT JACKING, ASSEMBLY AND RIGGING 12 HOURS

Airplane jacking and weighing and C.G. Location. Balancing of control surfaces – Inspection maintenance. Helicopter flight controls. Tracking and balancing of main rotor

UNIT IV REVIEW OF HYDRAULIC AND PNEUMATIC SYSTEM 12 HOURS

Trouble shooting and maintenance practices - Service and inspection - Inspection and maintenance of landing gear systems. - Inspection and maintenance of air-conditioning and pressurization system, water and waste system. Installation and maintenance of Instruments - handling - Testing - Inspection. Inspection and maintenance of auxiliary systems - Rain removal system - Position and warning system- Auxiliary Power Units (APUs).

UNIT V SAFETY PRACTICES 12 HOURS

Hazardous materials storage and handling, Aircraft furnishing practices - Equipments. Trouble shooting. Theory and practices

TOTAL: 60 HOURS

COURSE OUTCOMES:

Students who successfully complete this course will be able to:

CO1: Identify and apply the principles of function and safe operation to aircraft as per FAA

CO2: Describe general airframe structural repairs, the structural repair manual and structural control programme

CO3: Explain the nature of airframe structural component inspection, corrosion repair and non- destructive inspection

CO4: Evaluate aircraft component disassembly, reassembly and troubleshooting

CO5: Identify, install, inspect, fabricate and repair aircraft sheet metal and synthetic, material structures

TEXT BOOKS:

1. Kroes, Watkins, Delp, "Aircraft Maintenance and Repair", McGraw Hill, New York, 2022.

REFERENCES:

1. Brimm D.J. Bogges H.E., "Aircraft Maintenance", Pitman Publishing corp., New York, 2021.
2. Delp. Bent and Mckinely “Aircraft Maintenance Repair”, McGraw Hill, New York, 2019
3. Larry Reithmeir, "Aircraft Repair Manual", Palamar Books, Marquette, 2019.

WEB LINKS:

1. https://www.atsmro.com/airframe-services/

24DBAR81 **AIRLINE OPERATIONS CONTROL CENTRE (AOCC)**

L	T	P	O	C
4	0	0	2	4

COURSE OBJECTIVES:

This course enables the students to appreciate the fundamental role of the AOCC and to acquire the necessary knowledge and skills to function effectively as part of a very dynamic and highly responsive team.

UNIT I FLIGHT PREPARATION INSTRUCTIONS 12 HOURS

Flight Preparation Instructions Minimum Flight Altitudes, Criteria For Determining The Usability Of Aerodromes, Methods For The Determination Of Aerodrome Operating Minima, En-Route Operating Minima For VFR Flights Or VFR Portions Of A Flight, Presentation And Application Of Aerodrome And EN-Route Operating Minima, Interpretation Of Meteorological Information, Operational Practices For Interpretation Of Meteorological Information, Determination Of The Quantities Of Fuel And Oil To Be Carried, Mass And Centre Of Gravity, Standard Weight Values, Last Minute Change Procedures, Ats Flight Plan, Time Slot's - Calculated Take-Off Time, ATC Clearance, Operational Flight Plan, Aircraft Technical Log System, Cabin Defect Log, Flight Crew Certification Authorization, Dispatch Without An Authorized Engineer.

UNIT II FLIGHT PROCEDURES 12 HOURS

General Rules Of Flight Procedures, Navigation Procedures, Policy On Manual Flying, Policy And Procedures For In-Flight Fuel Management, Altimeter Setting Procedures, Altitude Alerting System Procedures, Policy And Procedures For Preventing Altitude Deviations / Level Busts, GPWS / EGPWS Procedures, Policy And Procedures For The Use Of TCAS / ACAS, Adverse And Potentially Hazardous Atmospheric Conditions., Wake Turbulence, Crew Members At Their Stations, Use Of Safety Belts For Crew And Passengers.

UNIT III STANDARD OPERATING PROCEDURES 12 HOURS

Fuel Efficiency Ops, Flight Preparation, Safety Exterior Inspection, Cockpit Preparation, Before Push Back, Push Back, Taxi, Take Off, Landing. Go Around and Missed Approach.

UNIT IV NON – NORMAL AIRLINE OPERATIONS 12 HOURS

All Weather Operations, Non-Normal Ops, Overweight and Hard Landing, Incapacitation of Crew Members, Cabin Decompression, Bird Strike, Medical Conditions in Flight, LVTO, Approach Prep, Approach Procedures, Failures and Associated Actions, ETOPS.

UNIT V **EFFECT OF DELAYED DECISION IN AIRLINE OPERATIONS** **12 HOURS**

Oxygen Requirements and Punctuality Delayed Fuel Decision, Hypoxia and Oxygen Equipment.

TOTAL: 60 HOURS

COURSE OUTCOMES:

CO1: Examine the critical role of AOCC in modern airline and airports.

CO2: Illustrate the general rules of flight Procedures and Navigation Procedures.

CO3: Examine the standard airline operating procedure.

CO4: Analyze the Non-Normal Airline operations.

CO5: Explain the effect of delayed decision in airline operations.

TEXT BOOKS:

1. Airline OM-A chapter 8.
2. Edissa Uwayo, "Airline and Airport Operations", Notion Press; 1st edition (23 September 2019).
3. Peter J. Bruce, Chris Mulholland, "Airline Operations Control", Routledge; 1st edition (29 December 2020).

REFERENCES:

1. Gerald N. Cook , Bruce Billig, "Airline Operations and Management", Routledge; 1st edition (3 February 2017).
2. Peter J. Bruce, Yi Gao, John M. C. King, "Airline Operations: A Practical Guide", Routledge, 2019.

WEB LINKS:

1. https://link.springer.com/chapter/10.1007/978-3-662-43373-7_4
2. https://www.researchgate.net/profile/Antonio-J-M-Castro/publication/277046924_Airline_Operations_Control_A_New_Concept_for_Operations_Recovery/links/55a76ca108ae410caa75320d/Airline-Operations-Control-A-New-Concept-for-Operations-Recovery.pdf?origin=publication_detail
3. https://core.ac.uk/download/pdf/4432416.pdf

24DBAR82 **PISTON ENGINE AND PROPELLER**

L	T	P	O	C
4	0	0	2	4

COURSE OBJECTIVES:

To equip students with a comprehensive understanding of the design, operation, and performance characteristics of piston engines and propeller systems used in aircraft, including their maintenance, troubleshooting, and integration with overall aircraft propulsion systems.

UNIT I FUNDAMENTALS & CONSTRUCTION OF PISTON ENGINE 12 HOURS

Fundamentals, Mechanical, thermal and volumetric efficiencies; Operating principles — 2 stroke, 4 stroke, Otto and Diesel; Piston displacement and compression ratio; Engine configuration and firing order. Engine Performance, Power calculation and measurement; Factors affecting engine power; Mixtures/leaning, pre-ignition. Engine Construction, Crank case, crank shaft, cam shafts, sumps; Accessory gearbox; Cylinder and piston assemblies; Connecting rods, inlet and exhaust manifolds; Valve mechanisms; Propeller reduction gearboxes.

UNIT II ENGINE FUEL SYSTEMS, STARTING AND IGNITION SYSTEMS 12 HOURS

Carburetors, Types, construction and principles of operation; Icing and heating. Fuel injection systems, Types, construction and principles of operation. Electronic engine control, Operation of engine control and fuel metering systems including electronic engine control (FADEC); Systems lay-out and components. Starting and Ignition Systems, Starting systems, pre-heat systems; Magneto types, construction and principles of operation; Ignition harnesses, spark plugs; Low- and high-tension systems.

UNIT III ENGINE INDICATION SYSTEMS 12 HOURS

Engine Indication Systems, Engine speed; Cylinder head temperature; Coolant temperature; Oil pressure and temperature; Exhaust Gas Temperature; Fuel pressure and flow; Manifold pressure. Engine Monitoring and Ground Operation, Procedures for starting and ground run-up; Interpretation of engine power output and parameters; Inspection of engine and components: criteria, tolerances, and data specified by engine manufacturer.

UNIT IV PROPELLER CONSTRUCTION 12 HOURS

Propeller Construction- Construction methods and materials used in wooden, composite and metal propellers; Blade station, blade face, blade shank, blade back and hub assembly; Fixed pitch, controllable pitch, constant speeding propeller; Propeller/spinner installation. Blade element theory; High/low blade

angle, reverse angle, angle of attack, rotational speed; Propeller slip; Aerodynamic, centrifugal, and thrust forces; Torque; Relative airflow on blade angle of attack; Vibration and resonance.

UNIT V PROPELLER MAINTENANCE 12 HOURS

Propeller Pitch Control, Speed control and pitch change methods, mechanical and electrical/electronic; Feathering and reverse pitch; Overspeed protection. Propeller Synchronizing and synchrophasing equipment. Propeller Ice Protection Fluid and electrical de-icing equipment. Propeller Maintenance, Static and dynamic balancing; Blade tracking; Assessment of blade damage, erosion, corrosion, impact damage, delamination; Propeller treatment/repair schemes; Propeller engine running.

TOTAL: 60 HOURS

COURSE OUTCOMES:

After the course the students are expected to be able to

CO1: Explain the working principle of piston engine.

CO2: explain about engine fuel system and other system like starting and ignition system.

CO3: Explain about the indicating systems.

CO4: Explain the design construction and working of propellers.

CO5: Explain about the maintenance procedures of propellers.

TEXT BOOKS:

1. Herschel Smith, “Aircraft Piston Engines”, McGraw Hill Higher Education (1 July 2021).
2. Ralph D Bent and Mckinley James L, “Aircraft Power Plants”, McGraw-Hill; Revised Ed. edition (January 1, 2020).
3. Airframe and Power plant Mechanics (EA-AC 65- 12A) -Power Plant Hand FAA.

REFERENCES:

3. Aircraft Piston Engines: For Professional and Private Pilots by Oxford Aviation Academy Limited, 2017.
4. Graham White, “Allied Aircraft Piston Engines of World War II”, SAE, 2018

WEB LINKS:

1.https://eaglepubs.erau.edu/introductiontoaerospaceflightvehicles/chapter/reciprocating-engine-propeller/